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NARRATIVE

OF THE

Proceedings of the Board of Engineers,

OF THE

BALTIMORE AND OHIO RAIL ROAD

Company,

FROM ITS

ORGANIZATION TO ITS DISSOLUTION,

TOGETHER WITH AN

EXPOSITION OF FACTS,

ILLUSTRATIVE OF THE CONDUCT OF SUNDRY INDIVIDUALS.

BY

LT. COL. S. H. LONG,

AND

CAPT. WM. GIBBS McNEILL,

Of the U. S. Topographical Engineers, and Members of the late Board of Engineers.

Baltimore:
PRINTED BY BAILEY & FRANCIS,
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1830.

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DISTRICT OF MARYLAND, TO WIT:

BE IT REMEMBERED, That on the third day of May, in the fifty-fourth year of the Independence of the United States of America, Josiah Bailey and William A. Francis, of the said district, have deposited in this office, the title of a book, the right whereof they claim as proprietors, in the words following, to wit:

"Narrative of the Proceedings of the Board of Engineers, of the Baltimore and Ohio Rail-road Company, from its organization to its dissolution, together with an exposition of facts, illustrative of the conduct of sundry individuals. By Lt. Col. S. H. Long, and Capt. Wm. Gibbs McNeill, of the U. S. Topographical Engineers, and members of the late Board of Engineers."

In conformity to the Act of the Congress of the United States, entitled "An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned;" and also to the act, entitled "An Act supplementary to the act, entitled 'An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned:' and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

PHILIP MOORE,
Clerk of the District of Maryland.

To the Stockholders of the
Baltimore and Ohio Rail-road Company:

THE magnitude and importance of the great work in which you are embarked, the successful accomplishment of which must be mainly dependent on your individual enterprize, should insure from those who may be honoured with your confidence, a zealous devotion to your interests; and the novelty and extent of the various operations which must mark the progress of this Rail-road, render essential to their economical and efficient execution not less an intelligent exercise of professional skill, than a rigid accountability to you for the proper application of your pecuniary means.

The undersigned have incurred the responsibilities of a station in your service, the acceptance of which invested them ostensibly with a direct control of every measure affecting either the location, or the construction of the Rail-road, and the period having now arrived when their former trust is committed to other hands, they feel it incumbent on them to lay before you a clear and candid exposition of the measures that have been adopted, the policy that has been pursued, and the peculiar kind of administration that has characterized the conduct and management of the affairs entrusted to the Board of Engineers, of which they have had the honour to be members.

You have been informed that charges of a serious nature had been preferred against an individual in the service of your company, implicating that individual in malpractices and delinquencies deeply affecting your interests. The precise nature of his alleged offences, with all the circumstances which subject him to suspicion, you have yet to learn.

You have been told that an impartial, deliberate, and thorough investigation into the conduct of that individual was instituted by a Committee of your Board of Directors, and that he was virtually sustained by the Report of that Committee. The undersigned would afford you the opportunity to estimate the merits of the question submitted to the decision of the Committee, with the means of judging how far the charges advanced were sustained by facts.

You have been apprized that observation and experience had taught the Directors that *some* change must be introduced into the administration of the affairs of the Company, in order to insure greater economy in the disbursement of its funds, and increased efficiency in the prosecution of the work. The course resolved upon as best calculated to promote so desirable an end was—simultaneous with the acquittal of an individual implicated in charges of a serious nature—the dissolution of the Board of Engineers, and the transfer of most of their duties and responsibilities to that individual, who has been retained on a footing which places him beyond even the wholesome restraints heretofore attempted to be imposed upon him.

In order to vindicate themselves from the reproach which may otherwise attach to them, the undersigned feel

constrained to make as explicit and unreserved a disclosure of the motives by which they have been governed, the measures they have advocated, the opposition they have encountered, and the evils resulting from that opposition, as the nature of the case may admit.

They accordingly have prepared, and now beg leave to submit to you the following pages, hoping that the tediousness of details may not deter you from a patient examination of the contents, since they would fain believe, information will be imparted which will not only afford a correct view of the progress and present condition of the Rail-road, but prove conducive to a more judicious, systematic and satisfactory management of its concerns.

For reasons which will be apparent from the period embraced in the "*narrative*," during the greater portion of which time, Capt. McNeill was either not a member of the Board of Engineers, or absent in Europe, the recital of measures included in it, has devolved entirely on Col. Long; while Capt. McNeill's more intimate connexion with recent events, has confined him more particularly to the "Expose of Facts."

The undersigned sincerely regret the circumstances which have rendered this disclosure so imperative and necessary; and they disclaim any other motive to giving them publicity, than that of counteracting their pernicious influence not only upon their own character, but upon the future progress of a work, the successful accomplishment of which, they have cherished with the utmost warmth and zeal, and still regard as an object worthy of the most eager pursuit. For their opinions in regard to the utility and efficacy of Rail-roads, as a

means of inland communication, they trust they stand somewhat conspicuously committed: and they again avow that their confidence in the feasibility of the Baltimore and Ohio Rail-road is not only unimpaired, but has been strengthened in proportion as the nature and extent of the difficulties to be encountered have been developed, and become more clearly understood. At the same time the undersigned are constrained to say, that the beneficial results, which you have a right to expect as the fruits of your enterprize, can only be realized from the most judicious and economical application of the means required for its accomplishment.

The exposure of errors and malpractices, be they of ignorance or intention, surely cannot be prejudicial to your interests; nevertheless, the contemplated disclosure has been withheld much longer than mere personal considerations recommend, in order to obviate even the remotest risk of affecting your interests injuriously.

(Signed) STEPHEN H. LONG,
WM. GIBBS McNEILL.

PART I.

CONTAINING

AN ACCOUNT OF THE

Proceedings of the Board of Engineers, &c.

FROM ITS ORGANIZATION TO THE 1ST OF OCT. 1829,
AND EMBRACING A PERIOD OF ONE YEAR
AND THREE QUARTERS,

BY

S. H. LONG,
President of the late Board of Engineers.

ERRORS AND OMISSIONS,

[IN PART I.]

Page 14, line 14 from top, for "different *plans* of inclination," read "*planes* of different inclination."

Page 15, in table for *Route No.* 1, read *Route adopted* and *vice versa*.

68, line 1 from bottom, for *farmed out* read *excavated*.

73, 18 from top, for *double* read *three times*.

90, 2 from top, after *motion*, read *Resolved that the Board of Engineers be directed to cause a stone viaduct to be erected across that stream on the 21st Section of the 1st Division*.

Page 106, line 3 from bottom, for *officers* read *affairs*.

131, 12 from top, for *monthly* read *quarterly*.

132, 2 from bottom, for *charges* read *changes*.

133, 4 from top, erase *See Appendix Doc. A. 2.*

133, 15 from top, after others insert, *See Appendix Doc. A. 2.*

139, 20 from top, for *this* read *a certain*.

159, 3 from top, after *square* insert *of*.

W. H. Cushman
Res. Eng.r R. Co. Md. & Va.
1830.

PRELIMINARY REMARKS.

INASMUCH as the events to be treated of in the following Narrative are more or less intimately connected with a variety of circumstances and measures antecedent to those events, a brief outline of the proceedings instituted in reference to the Baltimore and Ohio Rail-road prior to the organization of the Board of Engineers, will here be attempted, as an appropriate introduction to the Narrative.

In the month of February, 1827, and at a time when public attention was engrossed by projects for the construction of Canals as the surest and best means of facilitating internal trade and commerce, a few enterprising and influential citizens of Baltimore conceived the magnificent project of constructing a Rail-road from the City of Baltimore to the Ohio river.

One of the most prominent inducements that led to this bold step, was a conviction that some effectual effort must be made to sustain the declining wealth and importance of this City, or Baltimore must shortly cease to maintain her high rank among the commercial depots of the nation. The City of New York was now realizing the incalculable advantages springing from the liberal policy that led to the construction of the Erie canal. Pennsylvania had already embarked in a system of internal improvements, calculated to throw into the lap of her commercial metropolis, the riches of an extensive portion of the country. Virginia was ready to engage in the construction of canals, for the conveyance of western products to the ocean through the valleys of the Potomac and James rivers. Ohio had already

made rapid strides towards the accomplishment of a broad system of improvements, calculated not only for the distribution of her luxuriant products, upon her navigable borders, but for the transmission of foreign products into every part of the great basin of the Ohio river, while Baltimore, though blest by nature with one of the safest and most commodious harbours in the world, must forego the privilege of participating in the benefits resulting from the accomplishment of these stupendous works, for want of a suitable avenue leading in any direction to them.

The geographical position of Baltimore with respect to the natural channels of trade west of the Alleghany mountains, and especially its proximity to the Ohio river, compared with that of any other Atlantic city, could not fail to attract the attention of the projectors of the Rail-road. This circumstance probably had more influence than any other consideration, in establishing the confidence of the public, in the feasibility of the project, and in eliciting their friendly, and even zealous support of the measures that were taken in furtherance of its adoption.

A meeting of the citizens of Baltimore having been called for the purpose of deliberating on the "most efficient means of improving the intercourse between that city and the western states," the difficulties and uncertainties attendant upon the construction of a Canal for the object just adverted to, having been duly weighed, and the probable facilities, and increased advantages which might be expected to result from the adoption of a Rail-way in preference to any other means of conveyance having been ingeniously displayed, before the meeting, a resolution was passed for "immediate application to the Legislature of Maryland, for an act incorporating a joint Stock Company, to be styled the Baltimore and Ohio Rail-road Company."

Application was accordingly made prior to the close of the then present session of the Legislature, and a charter was granted, vesting in the Rail-road Company powers and privileges of a magnitude seldom equalled in legislative acts for the incorporation of joint-stock companies.

The charter having been obtained, was laid before the legis-

latures of Virginia and Pennsylvania for confirmation, which was granted by the former, with certain limitations, but was withheld by the latter, until their subsequent session, when a law was passed for that purpose.

Stock to the amount of one and a half millions of dollars, was offered for subscription on the part of individuals, and eagerly taken. This sum was subsequently doubled and the amount of private subscriptions was increased to three millions. The city corporation of Baltimore subscribed for half a million, and the Legislature of Maryland for an equal amount, making the aggregate amount of stock actually subscribed, four millions of dollars.

In fact the pecuniary means of accomplishing the work seemed not to be a desideratum. The manner in which it should be accomplished, and the direction proper to be pursued by the road soon become objects of more anxious inquiry and solicitude. With feelings truly American, and a confidence worthy the magnanimity that prompted the enterprise, the attention of its leaders, was bent upon the discovery of agents *at home*, to whose management the operations in furtherance of the undertaking might be confided.

The numerous inquiries made with a view to enlist in the service competent persons, to conduct their operations, resulted in an application to the War Department for the services of Dr. William Howard, who had for several years been employed in the United States service in the capacity of Civil Engineer, and of Lt. Col. S. H. Long and Capt. Wm. Gibbs McNeill of the United States Topographical Engineers, who had been extensively concerned in the operations of the country connected with Military and Civil Engineering. Not only were the services of these officers bestowed, but those of their assistants who had for some time been conversant with the details of civil engineering. The entire force thus obtained, in addition to the gentlemen above named, consisted of Messrs. Harrison and Guion, and Lieuts. Cook, Gwynn, Barney, Trimble, Hazzard, Dillahunty and Thompson.

All previous arrangements that were deemed necessary to the commencement of field operations, having been made, a general reconnoisance of the country likely to be traversed by the contemplated Rail-Road, was undertaken early in July, 1827; the officers ready for duty, consisting of Dr. Howard, Col. Long, Capt. McNeill, Mr. Harrison, and Lieuts. Barney, Trimble and Dillahunty.

These examinations were hardly commenced, when Col. Long was seized with a dangerous illness, and prevented from co-operating in the service during the residue of the season. In the mean time, reconnoissances were carefully and extensively made in almost every direction, between Baltimore and the Ohio river, so far as they could be effected without passing within the limits of Pennsylvania, in which, as yet, the company enjoyed no legal privileges. A full account of these examinations has been published, under the title of "Report of the Engineers on the Reconnoissance and Surveys," &c. to which we take the liberty to refer.

The examinations above alluded to, were completed in the month of November, and were succeeded by experimental surveys of three distinct routes from Baltimore to the Monococy, of one thence to Williamsport through Harman's Gap; of one from the mouth of Pipe creek to Fredericktown and thence to the mouth of Bush creek; and of one from the place last mentioned to the Point of Rocks. The officers engaged on these duties, in addition to those last named, were Mr. Guion, Lieuts. Cook, Glynn, Hazzard and Thompson. (For an account of these surveys, see the report above cited.)

The industry and despatch with which these examinations and surveys were performed, and the satisfactory and conclusive results to which they led, have been acknowledged and duly appreciated by an enlightened public. The report and memoirs in which a detailed account of these operations is given, exhibit a description of the aspect, soil and natural productions of the country adjacent to the numerous routes that were explored; of the nature, characters, and comparative merits of the routes

that were examined, and especially of those that were surveyed, and at the same time furnish a development of the principles, which, on mature deliberation, it was thought should govern in the location and construction of a Rail-road.

With direct reference to the report above mentioned, and the important facts developed by the examinations and surveys therein treated of, the President and Directors in their "Second Annual Report to the Stockholders," p. 3 and 4, state that "upon a careful consideration of the facts submitted to the Board, in the very able and satisfactory report of the United States Topographical Engineers, they were convinced that of the various routes which had been suggested, that along the valley of the Patapsco, and thence in the direction of Bennet's, Bush, or Linganore Creek, to the Point of Rocks, was so decidedly preferable, as to preclude any hesitation in awarding it the preference."

This conclusion of the Engineers so fully concurred in by the Board of Directors, resulted from a reference to the "*principles*" advanced in the Report, compared with the prominent characteristics ascribed to the numerous routes included "*within a triangle whose base is formed by the Ohio River, from the latitude of the southern Pennsylvania line, to the mouth of the great Kenhawa, and whose apex is at Baltimore.*" And since the influence of these "principles" has had, and continues to have, such an important bearing on the *direction of the Rail-road*, we deem it by no means irrelevant to the present occasion, to transcribe from the report in which they are contained, such portions as may elucidate the views which governed them. It was remarked by those who subscribed to the report that from the experiments of Tredgold and Wood, to ascertain the power required for the conveyance of a given load upon a level Rail-road, they should assume (as about the mean result of those experiments,) one hundred and fifty pounds as the appropriate load for a power or traction of one pound on the contemplated Rail-road, with wheels three feet in diameter. And agreeably to this assumption, the declivity required for the spontaneous descent of the load will be 35.2 feet in a mile. Hence the power

to overcome an ascent of 35.2 feet in a mile, (estimating the friction upon Rail-roads at $\frac{1}{150}$ of the entire weight of the load) will be double of that required on a horrizontal road, or an elevation of 35.2 feet, without regard to the angle of inclination, may be considered as a virtual increase of one mile in the length of any given section of the Rail-road. A reduction of friction by means of improvements that might naturally be expected to result from the opportunities that would be afforded for the exercise of ingenuity, did not escape consideration; but its known effects on the contrary, contributed to display the advantages of a level route, in a still more conspicuous point of view, whether resort should be had to the application of animal or of mechanical power. It was not, however, solely by a comparison of the effect of a given power on different plans of inclination, with that on a level road, that a preference was awarded by them to the route which has been adopted. Other important considerations were duly weighed, and it was apparent from a combined view of the probable *expense of construction*, the extent of country to be accommodated, the value of the products to be brought within the sphere of the Rail-road, from the fertile valley of the Shenandoah, and the cost of transportation, that the best interests of the Company could only be permanently secured by the adoption of the route, intersecting the Potomac at the "Point of Rocks," and the superior advantages of which must forever preclude an injurious rivalry with a similar work.

To present, however, in striking contrast, the two principal routes described in the Report of the United States' Engineers, and that it may be seen how far their prominent characteristics sustain the conclusions of the Engineers, we shall subjoin the following table, exhibiting the actual distance by either, from Baltimore to Williamsport, the aggregate height of summits and their equated lengths computed on the most unfavorable supposition which has been assumed in reference to the advantages of a level route. It should also be borne in mind, that by any route north of the Potomac, we should necessarily have encoun-

tered *four* summits, (a very important consideration, when the relative amount of transportation eastward and westward, may probably be in the ratio of one to five) while the route selected presents but one summit necessarily requiring stationary or local power.

Route, No. 2 as above	Aggregate height of Summits in feet.	Distance in miles.	Equated distance in miles.
By the valley of the Patapsco, Bush Creek, and the Point of Rocks.	886	104,60	129,77
Route Adopted. No 1			
By Jones' Falls and Harman's Gap, to Williamsport.	2,375	95,48	162,90

Mr. L. Cushman
New Castle Delaware
1830

NARRATIVE OF THE PROCEEDINGS, &c.

CHAPTER I.

A Board of Engineers constituted.—Operations of the first quarter of 1828.—Report of Doctor Howard, Colonel Long, and Captain McNeill.—Superintendent of construction appointed.—Various examinations and surveys instituted.—Choice of route to valley of Potomac.—Occupancy of narrow passes in said valley.—Preliminary surveys between Baltimore and the Patapsco.—Approximate elevation of the road between these two points.—Position for depositing the first stone selected.—Arrival of the Superintendent.—Various opinions in reference to his duties, &c.

The establishment of the Board of Engineers of the Baltimore and Ohio Rail-road Company, the proceedings of which will constitute the subject of this narrative, took effect on the first day of Janaary, 1828. A short time prior to this date, the President of the Baltimore and Ohio Rail-road Company explained to Col. Long the views entertained by the Directors of that institution, in reference to the appointment of competent engineers to whom the management of all operations for the accomplishment of the great enterprise in which the company had embarked might safely be confided.

A variety of considerations, which need not be enumerated on this occasion, were adduced as reasons for the employment of at least two principal engineers to take charge of a work so extensive, intricate and important, as that of the contemplated Rail-road, which was to embrace a distance of nearly three hundred and fifty miles, and call[illegible] exercise of care, skill and in-

dustry, more arduous and intense than could be bestowed efficiently by a single engineer.

Col. Long was at the same time invited by the President of the company to regard himself as a candidate for appointment as one of the principal engineers, and on being informed that Mr. Knight (with whom as yet he had no personal acquaintance, but of whose character and qualifications he entertained the most favourable impressions, from the representations of others,) was looked to as the other candidate with whom he was to be associated, he assented to the proposition.

A committee was subsequently appointed by the Directors of the company, to make arrangements for the engagement of the gentlemen above named, "as Engineers of the Baltimore and Ohio Rail-road Company," also for the establishment of a Board of Engineers, and to report thereon to the Board of Directors. The report of this committee is exhibited in the appendix at the end of this volume, (See Appx. Doc. A.) and explains the arrangements made by them, which appear to have been ratified by the Directors on the 6th of April, 1828.

In conformity to these arrangements, Col. Long and Mr. Knight were to enter into the service of the Rail-road company, as engineers, upon equal footing in authority and in compensation from the company; and these officers, together with "the President of the company, ex-officio, were to constitute the Board of Engineers," it being understood that the officer last mentioned was to be regarded as the "organ of communication" between the Board of Engineers and the Board of Directors.

Mr. Knight, who was then a member of the Senate of Pennsylvania, did not enter upon the duties of his appointment in the engineer service of the Rail-road company, until the 12th of April, 1828, at which date the constituent members of the Board of Engineers, assembled for the first time in their associate capacity.

In the mean time, the Engineer operations of the company were carried on under the supervision and management of Doctor *Howard, Col. Long,* and Capt. McNeill, officers in the service *of the General Government.*

Notwithstanding the inclemency of the winter season, preliminary surveys were indefatigably prosecuted by these officers and their assistants, with a view to a fair comparison of the various routes proposed, and to the final establishment of a decided preference between them, which resulted in favour of the route subsequently adopted, its claims to a preference having been ascertained by these surveys. The officers above named submitted a joint report of their proceedings, under date of April 5th, 1828: subsequently to which the affairs of the Engineer Department of the Rail-road Company were administered by the Board of Engineers.

In justice to the officers just mentioned, and to all others directly or indirectly concerned, it should be distinctly understood and remembered, that the system adopted by these gentlemen, in conducting surveys, &c., on account of the Rail-road, and the principles and opinions promulgated by them in their joint report, dated on the 5th April, 1828, (See Report of the Engineers on the reconnoisance and surveys, &c.) with a few inconsiderable modifications and improvements, are precisely the same as those that have subsequently obtained in the further prosecution of the Rail-road service.

During the period just adverted to, viz: the winter of 1827--8, a subject of deep interest to the people of Baltimore, was much agitated among the leading members of this community. This subject was the manner of introducing the Rail-road into the city. Col. Long had examined the various routes that appeared to have any claim to consideration in view of this subject, and had come to the conclusion that the most favourable route connecting with that by way of the Patapsco, and leading to tide-water, within the city of Baltimore, was that crossing Gwynn's falls, near the Old Furnace, traversing the flat grounds southwardly of Mount Clare, branching at Carroll's point, and in the vicinity of Cove-street, and terminating on tide-water at the point just mentioned, Spring Garden, and the head of the Basin. It was also the opinion of the same officer, that the road might be continued on either or both sides of the neck, separating the

waters of the Basin, from those of Spring Garden, to points accessible to vessels of the larger classes, or even to Fort McHenry, should it be deemed advisable.

It soon, however, became a subject of common observation, that the Corporation of Baltimore would not be satisfied with any route that did not lead to, or terminate at, the *City Block*. The attention of that officer was accordingly directed to the discovery of some other route by which this object might be accomplished.

Any person at all conversant with the natural aspect and topography of Baltimore, well knows that the Eastern part of the city is separated from the Western by a ridge of elevated ground, upon the summit of which stands the Cathedral, and which extends southwardly, quite to Baltimore street; and that between this ridge and the Basin, there are at present but two considerable avenues, viz: Baltimore and Pratt streets, connecting between the Eastern and Western portions of the city. It is also well known that the business at present done in these two streets, and the crowds with which they are almost incessantly thronged, added to the irregularity of their established grades, utterly preclude the expediency and feasibility of introducing a Rail-road through either of them. Nor is there any other avenue at present existing, or that can hereafter be opened, without incurring vast expense, by which the Rail-road could be conducted through this narrow pass.

Considerations like these, induced a diligent search in pursuit of a more favourable route, which was no where to be found but by passing the high grounds above mentioned, either by means of a deep cut, or tunnel, penetrating the ridge in the position and direction most conducive to economy of construction. In these views, Col. Long enjoyed the unqualified concurrence of the President of the Company, and subsequently of Mr. Knight, as will appear from the measures taken in reference thereto.*

On the 12th April, 1828, the Board of Engineers held their first meeting for the transaction of the business for which it had been instituted, at which, all the members, viz: P. E. Thomas,

* See chapters 4th, 5th and 6th.

S. H. Long, and Jonathan Knight, were present. (See appendix Document B.) At this meeting an organization was proposed and adopted, agreeably to which, P. E. Thomas was appointed President, and Jonathan Knight, Secretary of the Board.—Thus organized, the first act of the Board in the exercise of the authority vested in them by the Board of Directors, was the appointment of a Superintendent of Construction, at a "salary not exceeding two thousand dollars per annum, whose duty it should be *to aid in arranging contracts* for the execution of work upon the Rail-road, and *to see that all contracts* for the construction of the said road, *be faithfully carried into effect*, and also to perform *such other duties* connected with the service, *as the said Board should direct.*" Casper W. Wever had acquired the reputation in some parts of the country, of having been the agent to whom the public were indebted for the successful accomplishment of the National Road from Wheeling to Zanesville, in Ohio. The eclat he had thus obtained, together with the testimony of Mr. Knight in his favor, had impressed Col. Long with the belief, that within the circle of his acquaintance, a more suitable person could not be found, to enter upon the duties thus prescribed. Col. Long, at that time, had no other personal acquaintance with him, than that afforded by a mere introduction, and a very brief interview, and was not aware that the plaudits awarded to that individual, were due exclusively to his superiors at Washington, who had furnished him in detail, with all the information and instructions, necessary to the guidance of any one gifted with an ordinary understanding and capacity.

The economy and efficiency displayed in the work alluded to, did not result from any remarkable tact or talent possessed by Mr. Wever, but from the judicious instructions that were issued from time to time, by the Engineer Department, and from the rigid manner in which an observance of them was enforced. It is true, that Mr. Wever did, on several occasions, presume to question the propriety of the instructions thus received, and proposed to adopt measures unauthorised by them. But it is equally

true, that he was as often arrested in those measures, and *peremptorily* required to comply literally with his instructions.

These, and a variety of other circumstances, relating to the pretensions and qualifications of Mr. Wever, which need not be enumerated on this occasion, were entirely unknown to Col. Long, at the time of Mr. Wever's nomination to the office of Superintendent.

At the same meeting, (April 12th,) Col. Long was charged with the direction of certain surveys within the City of Baltimore, with a view to ascertain the most eligible route by which the Rail-road might be conducted into the city. In order to accomplish this object in a manner satisfactory to all parties concerned, a minute survey was instituted, by means of which the vertical, as well as the horizontal topography of all the grounds included within the corporate limits of the city, was to be obtained. The method adopted in reference to these surveys, was briefly as follows. Lines were to be run by compass and level, leading from the maratime margin of the city through every ravine and depression by the lowest routes, till they ceased to ascend. Lines were in a like manner to be run connecting with the former, and leading along the highest grounds of the city. These several lines were to be plotted, and intersected on the map by faint lines, showing the contour of the hill, &c., in horizontal sections elevated five feet above one another, commencing at mean tide and extending to the highest grounds in the city.

The next meeting of the Board took place on the 21st of April, when Col. Long, verbally reported the progress made in the operations above alluded to. (See Appendix, Document C.) At this meeting, Mr. Thomas informed the Board of Engineers, that he had communicated with Mr. Wever, on the subject of his appointment as Superintendent, and that Mr. W. had signified his willingness to accept it. It was subsequently understood that Mr. Wever was to enter upon the duties of that office on the 1st of July following.

April 25th.—Pursuant to a resolution of the Board of Directors, measures were now taken for a personal examination on the part of the Engineers, (Col. Long and Mr. Knight) of the principal routes leading from Baltimore to Williamsport, with the view of determining approximately upon the route proper to be pursued by the Rail-road between these two places. This duty was accomplished in part in the manner set forth in a report of those officers, submitted on the 5th of May, 1828. (See printed report appended to "Report of Engineers," &c. before cited, p. 87, 88, 89, 90.) The opinions of the Board of Engineers, were in coincidence with those previously expressed in the joint report of Col. Long, Capt. McNeill and Dr. Howard, and led to the adoption of the route, *via* the Point of Rocks, and valley of the Potomac, in preference to that, *via* Jones' falls and Harman's gap. (See second annual report of the President and Directors, pp. 3, 4.)

At the same time, arrangements were made for the accomplishment of additional preliminary surveys, preparatory to a definitive location of the road on the route thus selected. The execution of these surveys, and the examinations by which they were preceded, were confided to Lieuts. Gwynn and Trimble, assisted by Messrs. C. R. Barney and H. J. Ranney. Lieuts. Barney and Thompson subsequently co-operated in this service.

The instructions given in reference to the surveys above mentioned, were of the following import, viz: In proceeding westward, or from Baltimore, an ascent of *thirteen feet* in the mile, or an equal descent eastward, was to be regarded as preferable to a level. An ascent of *thirty feet* per mile in the former direction, was to be regarded as equivalent *to a level* in the latter direction; and any ascent exceeding thirty feet per mile westward, and all ascents eastward were to be regarded as inclined planes, on which provision must eventually be made for an increased motive power, in some due proportion to the rate of ascent. The conclusions above stated, were based on the suppositions, that the relative amounts of transportation in opposite directions, would be in the proportion of five tons east-

ward to one ton westward; that the weight of the carriage to that of its load, would be as one to three; and that the amount of resistance by friction would be equivalent to a horizontal traction or draft, of $\frac{1}{175}$ of the entire load.

At the same meeting, Col. Long was charged with the direction of certain surveys, having for their object the development of the most favourable locality for the Rail-road, from the City of Baltimore to the Valley of the Patapsco, and thence upward in the valley of that stream to the Union Factory. (See Appendix, document D.) In reference to these surveys, definite instructions were prepared and approved by the Board of Engineers, as exhibited in the document just cited.

The leading considerations kept in view, in framing these instructions, were briefly as follows:

A course of computations had been instituted, in which the two professional members of the Board of Engineers, viz: Col. Long and Mr. Knight, had participated, and which led to a variety of results; among which, the following are pertinent to the case before us, viz: 1st. That the average cost of constructing a double Rail-road, and keeping it in repair for ever, might be estimated at $25,000 per mile; or in other words, that the amount just mentioned, being invested at the rate of six per cent. on the date of commencing the construction of such a Rail-road, would be sufficient to defray the expense of construction and repairs for ever, on each mile of the road: 2d, That the present cost of transportation for ever, including prime cost and repairs of vehicles, &c., motive power, and attendance, and estimating the amount of transports, as equivalent to one hundred and fifty thousand tons annually in each direction, might be estimated at $50,000 per mile: 3d, That the power required to overcome an elevation of thirty feet, independently of horizontal distance, was equal to that required for the conveyance of the same load through a distance of one mile, upon a level road, all things considered: 4th, That, in view of the preceding conclusions, and others herein before advanced, in reference to the probable state of the trade

on the Baltimore and Ohio Rail-road, any deviation from the *grade* corresponding thereto, (viz: 13 feet per mile ascending westward) must be attended by a corresponding expenditure on account of transportation, and that any deviation from this *grade* amounting to fifteen feet, would result in an expenditure on account of transportation, equal to that of one mile, on account of construction: 5th, That ascents and decents were accordingly to be avoided as much as possible, as being incompatible with the facilities for transportation, upon which must be exclusively predicated, the utility and advantages to be derived from Rail-roads: 6th, That the granitic range constituting the northern and Western environs of Baltimore, and over which all the streams tributary to the Patapsco Inlet are precipitated, with a descent much greater than that corresponding to the state of trade upon the Rail-road, required that the road in its passage from Baltimore to the base of this range, and especially at the place last intimated, should have a position much more elevated than economy of construction merely considered, would seem to justify: 7th, That in order to interfere as little as possible with valuable improvements on the north side of the Patapsco, in the vicinity of Ellicott's Mills, a route for the Rail-road must be sought for on the opposite side of that stream, which must be crossed by means of a bridge, (probably at Pierpoint's rocks) elevated sufficiently to secure it from the ravages of the highest freshets.

It is obvious that the instructions last adverted to, were given with a view to the attainment of results preparatory *to a definitive location of the road*, on that part since denominated the First Division. The duties therein enjoined were arranged by Col. Long and assigned to Capt. McNeill's brigade.

In reference to these, and all subsequent operations connected with the preliminary and definitive surveys made on account of the Rail-road, we take this occasion to remark, that monthly estimates were regularly made by the officers charged with the superintendence of the work, and submitted to the Board of Engineers, for their approval; and that the amounts approved thereon, were placed to the credit of the officer who rendered the estimate, and were

employed by him in defraying the expenses incident to the service in which he was engaged. With respect to this branch of the service, the same system of accountability, as far as circumstances would permit, was rigidly adhered to, as that invariably enforced in the regular service of the United States.

On the 12th of May, 1828, Mr. Knight being again absent (on a visit to his family,) the President of the Company apprised this Board of the intention of the Board of Directors, immediately to get legal possession of the several narrow passes within the immediate valley of the Potomac, between the Point of Rocks and Cumberland, through which it might be necessary to obtain a passage for the Rail-road. (See Appx. Doc. E.) With a view to the speedy accomplishment of this object, the Board of Engineers passed a resolution directing Col. Long and Capt. McNeill, to cause such surveys to be made as might be necessary to determine and designate the several tracts thus to be occupied.—The instructions furnished to these officers on this occasion, are exhibited in the Document just cited.

In conformity thereto, the attention of Col. Long was directed to the survey of such tracts as might be required for the passage of the Rail-road, between the Point of Rocks and Williamsport, while Capt. McNeill was instructed to perform a similar service between the point last mentioned and Cumberland. These duties were performed with the utmost promptness and despatch, and were greatly facilitated by the aid of Messrs McMahon and Latrobe, Attorneys of the company, employed for the purpose of procuring for that body legitimate titles to the several tracts that might be surveyed.

While these operations were yet in progress, the Board of Directors passed a resolution, dated on the 28th of May, which was communicated to the Board of Engineers on the day following. Agreeably to this resolution, the Board of Engineers were required "forthwith to locate the road between the Point of Rocks, and the limits of the city of Baltimore, and that they keep in view that the same *shall terminate at a point best calculated to distribute the trade throughout the Town as now improv-*

ed." A copy of this resolution, and the order taken in reference thereto are exhibited in the appendix. (See Appx. Doc. G.)

As might be expected, the manner of introducing the Rail-road into the city of Baltimore, elicited much warm discussion among the citizens. Those of the western part of the city were divided into two parties, one of which were in favour of the route heretofore mentioned, leading past Carroll's point and Spring Garden to the Basin; and the other, in favour of a more northerly route leading to the more elevated parts of the town, north of Baltimore street, and west of Howard street; while the citizens inhabiting the easterly parts of the city, including the valley of Jones' falls, were averse to any route that did not afford to them facilities for a connexion with the Rail-road, equal to those that would be enjoyed by the inhabitants of the western portion of the city, by the adoption of almost any route, which, from the nature of the case, must pass through or into this section of the town.

These conflicting interests were so nearly balanced amongst the citizens, and especially in the City Council, that doubts were entertained as to the final issue of any measure that might be taken, having for its object the immediate selection of a route. A course of *diplomatic* negociation was accordingly set on foot, with a view to an amicable adjustment of this important concern, which, after much discussion on the part of interested individuals, members of the Board of Directors, and members of the City Council, at length, eventuated in the measure just cited; viz: that the road "*shall terminate at a point best calculated to distribute the trade throughout the town as now improved.*" Inasmuch as we shall have frequent occasions to treat of this subject, in the subsequent details of this narration, we forbear to enlarge upon it in this place.

On the 2nd of June, 1828, the Board of Engineers, in conformity to a resolution of the Board of Directors, published a notice calling for proposals in reference to the *grading* and *bridging*, on a portion of the Rail-road. (See Appx. Doc. I.)

By a recurrence to this notice, it will be seen that the prices for labour were to be graduated in conformity to the difficulties or facilities of the work, depending on a variety of circumstances therein adverted to; also, that the whole of the work was "to be executed under the direction and superintendence of the Board of Engineers, or such agent or agents as they may authorize and appoint for that purpose."

June 6th, 1828. A resolution of the Board of Directors was this day communicated to the Board of Engineers, directing that the construction of the Rail-road be commenced on the 4th of the ensuing month. (See Appx. Doc. K.) The necessary surveys preliminary to a definitive location, and to the commencement of the work not having been completed, instructions were immediately prepared authorizing additional surveys, the execution of which was subsequently confided to Mr. Howard's brigade. A copy of these instructions is exhibited in the Document just referred to.

In view of what has been stated, it may readily be inferred that the variety and multiplicity of operations, now claiming the attention of the Board of Engineers, and the care and precision with which they must be performed, in order to ensure satisfactory results: also, the limited number of efficient agents in the service of the company, compared with the extent and intricacy of the duties assigned them, and the despatch with which these duties were required to be performed, gave rise to serious apprehensions lest mistakes, prejudicial to the succesful accomplishment of the work, should be unavoidably committed; and at the same time contributed to disappoint the expectations of the Board, with respect to the completion of the surveys, at a date so early as that prescribed for the commencement of the work. The only disadvantage resulting from this state of things, however, consisted in a mere temporary postponement of the work. Subsequent events, which will be detailed in the progress of this narrative, have shown, that no mistakes of consequence were committed, and *that any embarrassments which have occurred, are*

ascribable rather to the peculiar kind of administration which has unfortunately prevailed in relation to the affairs of the Engineer Department of the Rail-road service, than to any want of foresight on the part of the Board of Engineers, in the adoption of measures, or to any defects in the manner of executing them.

June 9th, 1828. As the duties in the Engineer service of the Rail-road Company became more arduous and multifarious, the propriety of establishing a code of regulations for the government of this department of the service, became more obvious and imperative, and Capt. McNeill, prior to this date, had been requested by the President of the Company to compile a code of the description above intimated. In compliance with this request, a system of regulations had been prepared by him, corresponding as nearly as the nature of the two services would admit, to those adopted in the United States Engineer service. The system thus proposed was submitted to the Board of Directors, and by them subsequently referred to the Board of Engineers, on the date last mentioned, (June 9.)

At the time of submitting this project, the President of the Company verbally informed the Board of Engineers "that a plan for the organization of the Engineer Department of the Baltimore and Ohio Rail-road Company, providing a system for the government of the same, and *for securing a strict accountability in the fiscal operations of said company, and economy in the disbursment of its funds*," had been referred to this Board for examination, in order that such amendments might be suggested as the Board might deem beneficial.

The code thus submitted was attentively examined, and the provisions of its several articles carefully considered, during this and the following days, (June 9 and 10) and on the date last mentioned was returned to the Board of Directors with a few inconsiderable amendments, which were subsequently adopted by that Board, and the code became a constitution for the government of the Engineer Department of the Rail-road Company. The regulations are exhibited at full length in the

Appendix, (See Document L.,) and are of the following import:

The first article of the regulations designates the several officers and agents constituting the Engineer Department.

Article 2. Specifies the duties, powers, and privileges of the Board of Engineers, and invests them with exclusive control over all the operations connected with the surveys, location and construction of the Rail-road in all its parts and appendages, subject in all cases to the control of the Board of Directors; thus obviously implying that the Board of Engineers must obey all instructions emanating from the Board of Directors, and that all the decisions of the former were liable to be countermanded by the latter.

Article 3. Points out the duties of the Topographical Engineers and their assistants, and explains the relation in which they stand to the Board of Engineers.

Article 4. Designates the duties of the Superintendent of Construction, and his subordination to the Board of Engineers, expressly stating that "*He will receive all his instructions from the Board of Engineers.*"

Article 5. Exhibits the purport and manner of the various returns to be made by the different subordinate agents of the Department to the Board of Engineers, and the times of rendering them.

Article 6. Shows the disposition to be made of instruments, books, stationary, &c., belonging to the company.

Article 7. Points out the manner of keeping and rendering accounts for disbursements, quarterly abstracts, accounts current, and the disposition to be made of them. This article distinctly provides for a clear exposition of all the objects upon which the expenditures shall have been made, and the respective amounts expended thereon. It also provides for an examination and approval by the Board of Engineers, of all accounts and expenditures for surveys and construction of the Rail-road, and the works appertenant thereto, preparatory to their final adjustment.

Article 8. Relates to the responsibilities exacted of any agent to whom the funds or other property of the company may have been entrusted.

Article 9. Specifies the duties of the Treasurer of the company: also, those of the committee on accounts, in relation to the fiscal operations:

Article 10. Requires that this committee report, *in writing*, setting forth a full expression of their opinions as to the proper or improper application of the funds of the company.

Article 11. Points out the manner in which funds must be appropriated for the exigencies of the Rail-road service. In connexion with the fifth article, to which the article before us expressly refers, it provides that the funds of the company shall be applied to the purposes above intimated, *exclusively on estimates approved by the Board of Engineers.* This article also expressly provides that "payments on the fulfilment of contracts for the construction of the road will be made by the Treasurer on the order of the President; which order *will only be given on the certificate of the Board of Engineers*, from an inspection of the work, that the contracts have been fulfilled."

Article 12. Provides for the payment of contingent expenses in the city of Baltimore, which are to be made as nearly as practicable in conformity to the regulations affecting other payments.

The adoption of these regulations was warmly advocated by Messrs. Thomas and Knight, and opposed by Col. Long, on account of their not having been suffieiently explicit on the subject of forms for accounts, abstracts, contracts, &c. &c., which, in the opinion of that officer, ought to have been incorporated with the regulations. His objections were, however, waived on the ground then admitted to be correct, viz: that by the regulations in question, the Board of Engineers had the right and power to prescribe such forms as they might think proper, and to enforce a rigid observance of them; also that the forms prescribed in the regulations for the United States' Engineer De-

partment, it was provided should be adhered to, as nearly as the nature of the two services would permit.

The regulations, as amended and adopted, were printed at the instance of the Board of Directors, and copies thereof furnished to the different agents of the company for their information and government. (See Document L.)

June 11th, 1828. Arrangements were now made by the Board of Engineers, for a farther prosecution of preliminary surveys, on the route recently adopted by the Board of Directors, (See Appendix, document G.) which were still requisite before a judicious location could be made. Two parties were accordingly to be organized, one consisting of Dr. Howard's, and the other of Col. Long's brigade, Capt. McNeill's being still engaged on definite duties heretofore assigned them. Dr. Howard's party were to be employed on the portion of the route situated between Baltimore and Parr Spring Ridge, and Col. Longs, on the portions situated between the Ridge just mentioned and the Point of Rocks. Instructions for the guidance of the parties just mentioned, were prepared by the Board of Engineers and forwarded under date of June 13th, the purport of which is briefly as follows.

In addition to the instructions already cited, (See document K.) which were now to be given to Dr. Howard for the guidance of his party, the following were also communicated, viz: "The distance run on any course, will not be less than 100 feet. The angle of deflection between any two courses, will not be greater than 14¼ degrees. Profiles of all grounds where excavations and embankments are required, must be accurately taken, and the data requisite to a computation of the respective amounts of cutting and filling, carefully obtained. Plans and profiles illustrative of all these surveys, will be prepared with all practicable dispatch, and kept subject to the inspection of the Board of Engineers."

The instructions to Col. Long's party were very similar to those above recited, except in so far as they related to the descent from Parr Spring Ridge, to the valley of the Potomac. In reference to this part of the route, two modes of descent were

contemplated, viz: one by an alternation of inclined planes and levels, and the other by a declivity as equable as the nature of the ground would admit, in the immediate valley either of Bennett's, Bush, or Linganore creeks. With respect to the latter of these modes, the instructions alluded to were sufficiently applicable; but in relation to the former, the following directions were given, viz: The system of planes adverted to, was to consist of a series of inclined planes, straight in their direction, and of equable slopes, their inclination not to exceed three degrees. This inclination being the greatest admissible, in order that the descent of loaded cars might be regulated by *brakes* or *convoys* attached to the carriages. In case an opportunity presented for an inclined plane, more than half a mile in length, a horizontal deflection was admissible midway of the plane, accompanied by a horizontal grade 150 feet in length, for the accommodation of stationary machinery, which might at once subserve the double purpose of upward transportation on both parts of the plane.— The inclined planes were to be separated from each other by horizontal grades of greater or less extent, according to the condition and aspect of the natural surface. The direction of the route was to be such as would render the distance from the Ridge to the Point of Rocks, the shortest practicable, due regard being had to economy of construction. The elevation at which the road should enter the immediate valley of the Potomac, was to be four feet above extreme high water of that river.

Both parties were required to execute drawings illustrative of their surveys, in a manner to keep pace with the progress of the field operations. All these surveys were, of course, to be preceded by a minute and careful examination of all parts of the country through which they were to be conducted.

The Board of Engineers were to be kept apprised of the progress made in these operations, by reports from the officers charged with their superintendence, and were to be applied to for instructions, whenever doubts existed as to the measures proper to be taken.

The operations designated in the foregoing instructions were prosecuted with unremitted industry, and brought to a satisfactory conclusion in due time, with the exception of those in the vicinity of Baltimore, which were of a character too complicated and multifarious, to admit of their completion, in season for the commencement of the work of construction on an extensive scale, at the time fixed upon for that purpose. The number and extent of the lines to be surveyed, and the multiplicity of facts to be ascertained as data upon which a correct decision could be made upon the intricate question concerning the elevation at which the Rail-road should enter the City, proved far greater than had been anticipated. This question involved the entire position of a line more than ten miles in length, traversing a district of country exceedingly diversified and broken, and of a character in all respects calculated to render the assumption of any elevation between forty and ninety feet above mean tide, extremely unsatisfactory, unless it were based on minute and accurate surveys. The surveys made agreeably to the instructions just recited, as also those heretofore instituted, (April 12th, 1828,) for similar purpose in the City of Baltimore, were of the character just intimated, and the results thus laboriously obtained, enabled the Board of Engineers gradually to reach their final decision upon the question.

June 23, 1828.—On this day the Board of Engineers *unanimously* adopted a report containing their approximate decision in reference to the question above considered; agreeably to which the position of the Rail-road, at the Western boundary of the city, was limited to an elevation not less than sixty nor greater than seventy feet above mean tide. The reasons of this decision are briefly stated in the report just mentioned, which is published at full length in the First Annual Report of the Board of Engineers, pp. 41, 42 & 43.

The surveys consulted in order to arrive at this conclusion, were executed by the following officers, and in the following order:—Those in the city of Baltimore by Col. Long's brigade, in conformity to the instructions of the 12th April. Those be-

tween Baltimore and the Patapsco, and upward in the valley of this stream, by a part of Capt. McNeill's brigade, in conformity to instructions of May the 5th. Additional surveys in the vicinity of Baltimore, by Doct. Howard's brigade, in conformity to instructions of June 6th.

In the report above mentioned, the place at which the Rail-road should be commenced, and the point at which the first stone should be deposited, were particularly designated. The views and opinions therein exhibited, as well as the measures therein contemplated, elicited a warm concurrence, and an unqualified approbation on the part of the Board of Directors. (See 2d Annual Report of the President and Directors, page 8.)

The period fixed for the Superintendent to enter upon the performance of his duties was now at hand. Mr. Wever who had been appointed to that office, accordingly made his appearance about the 20th of June, and held himself in readiness to embark in the Rail-road service, on the 1st of the ensuing month.

Notwithstanding the provisions contained in the regulations for the government of the Engineer Department, (See Appendix Document L.) and especially in the 4th, 5th, 6th & 7th articles of that instrument, the appropriate duties of this officer became a subject of warm discussion, in which Mr. Wever gratuitously took part. While an applicant for the office, his views and expectations appeared to be sufficiently moderate, as evinced by the tenor of sundry letters addressed by him to Col. Long pending the negotiations that led to his appointment; but having obtained this object, his communications assumed quite a dictatorial character and tone.

The following is a summary exposition of Mr. Wever's views in reference to the duties before him. He must enjoy unqualified control over all operations connected with the grading and masonry of the road, to the exclusion of any interference on the part of the Board of Engineers. He must exercise the privilege of changing the location of the road, whenever he thought the interests of the company might be promoted thereby. He must be entrusted with the making and management of all con-

tracts for the construction of the road, and must have full power to carry them into effect. He must make all payments on account of grading and masonry, and annex such penalties to the non-performance of contracts as *he* might deem proper. He must appoint and employ such assistants as he might think proper; which assistants should be held accountable to him alone, and receive all their instructions from him. In fine, to use his own language, "The Board of Engineers might tell him *where to make the road*, and when *he had made it*, they *might* inspect and accept it"—for he did not desire any interference on their part, farther than to acquaint him with their views as to the location, in the first instance, and with their decision upon the merits of the work when it had been finished. He even wished to exclude the Board of Engineers from any agency in the measurement and inspection of the work, from the time of its commencement to that of its completion.

That these were his views, is sufficiently corroborated by the forms of contracts submitted by himself, which will be particularly noticed in their proper places.

To these views Col. Long objected, giving it as his opinion that they were totally at variance with the letter and spirit of the regulations prescribed for the government of the Engineer Department; and that they could not be sustained by the Board of Engineers, without compromitting their responsibility, judgment, character, efficiency and usefulness. He moreover urged that the powers and privileges, above considered, had been exclusively delegated to the Board of Engineers, who were expressly charged with "*a general superintendence and control of all operations relating to the location and construction of the Rail-road, and the works appertenant thereto—the manner of constructing it in all its parts and appendages—the receiving proposals, concluding contracts,*" *&c.*; (See Document L.) and was decidedly of the opinion that the Board of Engineers had no right to delegate these powers to others.

Col. Long was in favour of limiting the duties of the Superintendent to the arrangement and personal supervision of con-

tracts, to an adjustment of contracts preparatory to their approval and ratification by the Board of Engineers, to a personal superintendence of the operations of contractors, and to the payments to be made therefor, in conformity to the measurements and estimates of work actually done, which measurements and estimates should be made under the immediate direction of the Board of Engineers.

The other members of the Board of Engineers, viz: Messrs. Thomas and Knight did not concur in the opinions of Col. Long, but were inclined to favour the views of Mr. Wever.

The consequences resulting from this intimation of the opinions of a majority of the Board to sustain Mr. Wever in his pretensions, expressed in his presence, have an intimate connexion with, and an important bearing on, all the subsequent transactions of the Board in relation to the construction of the road, and will be fully explained in the sequel of this narrative.

CHAPTER II.

Commencement of the Rail-road.—The elevation at which the City should be entered.—Definitive surveys instituted—Opinions relative to the deep cut.—Method of tracing a Rail-road.—Passage of Gadsby's run.—Wooden structures as substitutes for embankments.—Of wooden, stone, earthen, and brick structures.—Dimensions of the graded surface of the road.—The duties and authority of the Superintendent considered.—Instructions prepared for Superintendent.—His duties partially defined.—Forms for contracts approved by Messrs. Thomas and Knight: objected to by Col. Long.—Forms adopted by a majority of the Board.—Surveys on Linganore and Bush creeks ordered.—First division subdivided into sections, and farmed out for construction.—Instructions to Mr. Wever disregarded, and concealed from his assistants, &c.—The location to be expedited.—Another method of tracing a Rail-road.—Captain McNeill acts as Superintendent in the absence of Mr. Wever—First Annual Report prepared by Col. Long.

On the fourth day of July, 1828, the interesting ceremony of commencing the construction of the Baltimore and Ohio Rail-road was performed at the spot designated in the preceding chapter, when, "in the presence of assembled thousands," the venerable statesman and patriot, Charles Carroll, of Carrollton, laid the first stone of this magnificent work. The preparations and consummation attendant on this ceremony, occupied the attention and delighted the fancies of all who participated in the busy scenes of the occasion, or felt interested in the success of the enterprise.

The surveys heretofore instituted with a view to the location of the road between Baltimore and the Patapsco, had prov-

ed more laborious, and required more time for their accomplishment than had been anticipated. The Board of Engineers were in consequence unable to effect a definitive location of the road on this part of its route, prior to the date above mentioned. In order to determine the precise elevation above mean tide, at which the road should be conducted between the points above mentioned, Col. Long and Mr. Knight were daily engaged in personal examinations of the intervening country, and in comparing the results daily developed by the surveys which were still in progress. At length a careful comparison of all the facts bearing upon the subject, led to the adoption of sixty-six feet above mean tide, as the elevation best adapted to the natural surface, and most conducive to the "accommodation of the city as now improved."

In order that the views by which the Board of Engineers were governed in determining the position and elevation of the road between Baltimore and the valley of the Patapsco, as also the manner of its connexion with the "town as now improved," may be more fully understood, we shall here transcribe from the "First Annual Report of the Board of Engineers," (pp. 4, 5, 6) a few paragraphs explanatory of those views, which are as follows:

"In the performance of this part of their duty, (the delicate and difficult task of designating the most appropriate route for the Rail-road from the city of Baltimore to the valley of the Patapsco) the Board of Engineers have experienced great relief, in consequence of the order taken by the Board of Directors, in relation to this subject, in conformity to which, the paramount consideration by which their decision must be governed, was the 'accommodation of the city of Baltimore, *as now improved.*' "

"With this object constantly in view, surveys and examinations were made, and a multiplicity of facts developed, the details in relation to which need not be repeated on this occasion, all of which having been carefully weighed and compared, constituted

the basis of the decision of the Board of Engineers, as expressed in their report, dated on the 23d of June last."

"In reference to this decision, the Board of Engineers, after all the additional information since acquired, beg leave to reiterate, their firm belief and conviction, that no other route can be found so likely to subserve the present interests of Baltimore, and at the same time to afford the means of contributing to its future growth and accommodation."

"On this occasion, we beg to be indulged in a few remarks on the nature of the connexion that ought to subsist between the Rail-road, regarded as a great commercial avenue, and Baltimore, as the emporium and reservoir of all its traffic."

"1st. The main avenue, throughout its whole extent, should be kept free from obstructions of every kind that may have a tendency to impede or embarrass the traffic to which it gives birth, consequently no warehouses, depots, nor other places of business, likely to create obstacles in the way of free passage and transportation, ought to be admitted directly upon, or in immediate contact with the main road."

"2d. The bustle unavoidable in a densely populated city, ought as much as possible to be excluded from the main road, not only on account of the safety and convenience of transportation, but for the security of the citizens against numerous accidents, many of which might be attended with the loss of human lives."

"3d. Were the main road to pass through, or terminate at the place where the greatest amount of business is done, the transportation must necessarily encounter the difficulties suggested in the preceding remarks; its course and termination ought, therefore, to be as remote from places of bustle and business, as the nature of the case will admit."

"4th. The graduation and other adjustments of the main way, ought to be executed in rigid conformity to the principles upon which facility and economy of transportation depend, otherwise the traffic will be greatly impeded, and the freedom of passage obstructed. Such a graduation *of the great leading road* along a thickly settled street, for example, Pratt or Baltimore street,

would not only be attended with incalculable expense, but would be utterly inadmissible; inasmuch as it would oppose an insurmountable barrier to the streets, intersecting it, except in places where the level of the Rail-road, and the cross-street happened to be coincident, or nearly so.

"5th. All depots, warehouses, &c. within the limits of the city, ought to be connected to the main way by means of *branch Rail-roads*, descending from the former to the depots, &c. These branches (by means of single tracks) may be conducted from any points, on the main road, along many, if not most of the streets of the city, without subjecting the traffic thereon, to the hazard and inconveniences before mentioned. For a carriage or train of carriages, proceeding from the main road to any depot, may be allowed to move by horse power or otherwise, as slowly as may be deemed proper, without interrupting the transportation upon the main line; and on moving from the depot to the main road, the same precaution may also be observed.

"6th. The elevation adopted for the Rail-road within the city of Baltimore, and for the distance of about six and a half miles beyond, is sixty-six feet above mean tide. This altitude, as before observed, was indicated by the surveys, as that best adapted to the nature of the ground, viewed in connexion *with the injunction limiting our choice.* With this altitude, the road may be conducted by a line, whence diverging or branch Rail-roads may be made, as stated in our report of the 23d June last, extending to navigable water, at any place between Harris' creek and Carroll's point, inclusive. Indeed, no route could possibly afford greater facilities for branch Rail-ways, leading in almost every direction within the city of Baltimore from the main line, as examples; branches may also be conducted upward along Jones' falls, Gwynn's run, Gwynn's falls, &c. &c. It is not anticipated that any mart or depot will be required on the *main avenue;* but merely an occasional increased width of way along the line, adapted to the reception of carriages, forwarded on the branch Rail-ways, from depots or warehouses in any parts of the city.

"7th. Were the elevation of the main line greater than that adopted, or its distance from the water less, the descent from the road being thereby rendered more abrupt, would be attended with difficulty and danger, and at the same time the expense of construction would be greatly enhanced."

July 9, 1828. Having arrived at the decision above considered, the Board of Engineers were prepared to engage in the location of the road from the city of Baltimore, westward; and on the date just mentioned, a resolution was unanimously passed, all the members being present: in conformity to which, Capt. McNeill was charged with this duty—Doct. Howard and his party having been previously withdrawn from the Rail-road service by an order from the War Department, requiring his services in another quarter.*

The instructions given to Capt. McNeill on this occasion, are exhibited in the Appendix, (See Document N.) Agreeably to these instructions, the grade line of the road was to be elevated sixty-six feet above mid-tide; that altitude, judging from the facts already obtained, being best adapted to a state of minimum excavation and embankment on the first seven miles of the road, through which it was to be conducted on a dead level. The direction of the route, in other respects, was also to be such as would render the amounts of excavation and embankment, respectively, equal to each other, or as nearly so as practicable. From Dorsey's run, at the end of the seven miles above mentioned, the route was to ascend along the valley of the Patapsco

*The occasion of the order above adverted to, was as follows: Owing to the limited amount of funds appropriated by the General Government on account of surveys, &c. for internal improvements, the War Department deemed it improper to bestow the services of Doct. Howard's brigade (the expenses of which must be defrayed out of the funds alluded to) upon this branch of the public service, and at the same time allow the officers of the Army, already in the Rail-road service, to remain in the employ of the company. The Directors were, accordingly, apprised that the expenses of the civil brigade, (Doct. Howard's) must be defrayed by the company, if they continued in this service. The Directors, however, did not think proper to comply with these terms, and in consequence Doct. Howard's brigade were ordered upon other duties.

to Pierpont's rock, at such a rate that it might be conducted across the stream at that place, in a position sufficiently elevated to place the bridge required for that purpose, above the reach of the highest freshets. From Pierpont's rock, the route was to ascend along the southwestern side of the Patapsco to Ellicott's Mills, which it was to pass at an elevation of fourteen feet above the surface of the Frederick turnpike, in order to afford that road sufficient room for a passage beneath the Rail-road.

The ridge dividing between Gwynn's falls, and the Patapsco, was regarded as the most formidable obstacle on this part of the route. The Engineers were earnestly engaged for some time in devising the most feasible mode of passing it. Holes were bored at intervals along the line leading across the ridge, in order to ascertain the nature of the materials of which it was composed. The developements thus made, showed that the ridge was composed of alternate layers of clay and sand, the hardness and tenacity of which were not discoverable. No evidence of rocky formations appeared. These discoveries were succeeded by computations which were made, in order to determine the comparative cost of a tunnel and open cut, as a means of passing the ridge. The result, assuming the cost of excavation at 15 cents per cubic yard, was in favor of the open cut. Col. Long proposed that examinations and surveys should be made, in order to ascertain whether the ridge might not be passed more advantageously, by means of stationary power upon its summit, and an inclined plane upon each side, supposing that it might be more economical to adopt this mode in the outset, and to substitute a tunnel at some future day, when the business to be done upon the road should justify the expense of its construction. Mr. Knights reply to this proposition was in substance, that it was not advisable to admit of any inclined planes on this part of the road, after having taken so much pains for the sake of a level route, and that if the company were not prepared to encounter the expense of a thorough cut, of the extent contemplated, they might as well abandon their enterprise.

With regard to Mr. Thomas' opinion on this subject, it may be readily inferred from his own words, which are as follows: "The Engineers could not with any regard to the ecomonical application of motive power, admit on this part of the route, the *least descent in its progress westward*," i. e. in its progress westward from the first stone. (See second annual report of the President and Directors to the stockholders, p. 8.)

The amount of excavation required for the passage of this ridge, was about equal to that of a cutting 3-4 of a mile long and 34 feet deep, or about 320,000 cubic yards. The entire length of the thorough cut was 3-4 of a mile, and the greatest depth 78 feet, which continued for a very short distance only. Moreover the passage of a ridge so small in comparison with others on the route to the Ohio river, by any other means than a thorough cut, would have been altogether incompatible with the gigantic purpose of the enterprising projectors of this magnificent work, who had in view the stupendous project of "A DIRECT RAIL-ROAD FROM BALTIMORE TO SOME ELIGIBLE POINT ON THE OHIO RIVER." (See "proceedings of sundry citizens of Baltimore" p. 31.) traversing numberless lofty mountain ridges at the expense of cuttings immeasurably deep, and extensive, ten feet wide at bottom!!! and twenty feet wide at the surface or top of the ridge!!!

In regard to the altitude of the grade line, as fixed upon by the Engineers, the following language is used Oct. 1, 1828, in the "Second Annual Report of the President and Directors to the Stockholders," p. 8. viz: "The Directors *are satisfied* that the elevation (66 feet) above tide, at which the Rail-road was commenced, *is best calculated to secure the permanent interest of the City of Baltimore.*"

This discussion has been considerably protracted, in order to show more clearly that no undue influence, prejudicial to the interests of the company, was exercised by Col. Long in reference to the elevation and location of this part of the road, although such an influence is said to have been ascribed to him.

Prior to the time of issuing the foregoing instructions to Capt. McNeill, Mr. Knight had been much occupied in preparing al-

gebraic formulas, diagrams, tables, &c. based upon and resulting from the principles advanced in the "*Report of the Engineers on the reconnoissance*," &c. p. p. 65, 66, 67, 68, and the manner of tracing curves therein recommended. These formulas and tabular deductions were ingeniously drawn, and proved of great service in the surveys connected with the definitive location contemplated in the instructions alluded to, in reference to which they were employed. The method thus enlarged and improved by Mr. Knight, is the same as that adverted to in the "First Annual Report of the Board of Engineers," p. 17, as "depending on a series of equal chords and corresponding ordinates, erected on equal divisions of the chord, and the relations of tangents to the arcs of those chords, accompanied by a series of algebraic formulas and geometrical diagrams, illustrative of the principles recognised by the system, and of their application in tracing the route of a Rail-road." The only considerable inconvenience that resulted from the adoption and use of this method, consisted in the delays attendant upon the frequent computations that must be made in the field, thus interrupting the progress of the surveys.

The public notice heretofore referred to, (See Appx. Doc. I.) elicited a variety of proposals from persons wishing to enter into contracts for the construction of the road. But inasmuch as the location had been unavoidably retarded by causes already explained, and certain improvements in the manner of making and receiving them, having been suggested by the superintendent, no contracts were based upon these proposals. The persons who had offered were invited to attend upon the line of the road, on the 25th instant, in order to a personal inspection of the ground upon which they were to operate, and to enter into such contracts as they might be disposed to make from their own observation.

In the mean time the surveys connected with the definitive location of the road between Baltimore and Ellicott's Mills, were prosecuted with the utmost despatch. The personal attendance of Mr. Knight was very frequently bestowed, as also that of Mr. Wever, who had been invited to attend, and to make any sug-

gestions in reference to the location, to which his experience might give rise. Col. Long was very seldom present with the party engaged in these operations, his attention having been more particularly directed to the surveys west of Parr spring ridge in which the officers of his own brigade were still engaged. At the time when Capt. McNeill was directing the location across the valley of Gadsby's run, Col. Long was however present, and gave his opinion as to the most economical route for passing that ravine. He advocated a route deflecting near the Mine Bank hill, in such a manner as to approach the Washington road and cross the stream a little below the bridge, upon which that road crosses it, and thence pass to the immediate site of the Washington road, which must in consequence be slightly deflected from its present bed,—pass under and then along the south side of the Rail-road to a point in its present site, a little beyond the six mile stone; while the Rail-road might be made to pass upon, or in the vicinity of the old road, and diverge from it, near the point just mentioned. His reasons for preferring this route were, that the amount of embankment required thereon, would not exceed one half that required on the more direct route, which was advocated by others. This question was, however, settled in conformity to a proposition from Mr. Knight, agreeably to which a wooden viaduct one thousand feet long and about fifty feet high, was to be substituted for that portion of the embankment situated in the immediate valley of the run. On this ground Col. Long waived his objections to the direct route.

On former occasions the Engineers of this Board had frequently been engaged in computations of various kinds, touching the cost of various items of construction in their application to Rail-roads. Among these items, was that of wooden structures in general, and especially structures of this character, contrasted with embankments, and regarded as substitutes therefor. The conclusions at which they arrived, related more particularly to the cost of these two modes of construction, in the vicinity of Baltimore, and were briefly as follows, viz: that an embankment less than eighteen feet high, costing at the rate of 14 cents per cubic

yard, would be cheaper than a substantial frame work of the same height. That a substantial frame work more than eighteen feet high, provided stones suitable for foundations could be procured near at hand, would prove cheaper than an embankment of the same height costing at the rate above mentioned. Also, that a wooden viaduct 50 feet high, and substantially trussed, provided the stone required for its piers and abutments could be procured near at hand, would not cost more than $15 per foot for every foot of its length, or but little more than one half as much as an embankment of the same height, estimated at the rate above mentioned.

The Board of Engineers had bestowed their most careful attention upon the subject of structures of wood, stone, earth and brick, and to the modes of such structures best adapted to the climate and condition of this country. In order to arrive at safe conclusions in reference to these subjects, they had consulted many of the most experienced engineers, both military and civil, and had inquired particularly into the present state of some of the most ancient works of this country, in order to acquire a knowledge of their excellencies and defects, whereby they might be enabled to imitate the former, and guard against the latter.

A summary view of the particular subjects to which these enquiries related, and of the results to which they led, is exhibited in the following statements:

1*st. Of Wooden Structures.*

The timber deemed most suitable for sleepers, piles, &c. for the support of wooden rails, was that of locust and red cedar, being more durable when exposed to moisture, and coming in contact with the ground, than any other timber that could be procured in this part of the country. Rock-oak, or chestnut-oak, was to be employed for the same purposes, in situations where the other could not be conveniently obtained. The dimensions of the sleepers were fixed at eight feet in length, and five inches in diameter at the smallest end, exclusive of sap. The

timber deemed most suitable for rails, was heart yellow-pine, six inches square, and in lengths from fifteen to fifty feet. For this use Southern pine (from North Carolina, South Carolina, and Georgia) obtained the preference over that from a more northerly climate. The timber deemed most suitable for the construction of bridges, viaducts, and other frame work, was white pine, of various dimensions, adapted to the nature and size of the structure. The reasons upon which this preference was grounded, were the lightness and stiffness peculiar to this kind of timber, and more especially its exemption from the ravages of worms, insects, &c., which are less likely to prey upon this than upon almost any other description of timber.

2d. Of Stone Structures.

The stone applicable in the construction of the Rail-road consisted of three varieties, viz: granite, limestone, and silicious free-stone. The first of these only was attainable in the neighbourhood of Baltimore; the second in the valley of the Patapsco, near the forks of that stream, in the valley of Bush creek, and at various other points westward of the Monocacy; and the third generally on the spurs and ridges of the Alleghany mountains.

The description of masonry proposed to be adopted, was that generally denominated *rubble work*, for abutments, piers, and other walls, and range work for the arches of bridges, culverts, &c. No facing or hammer-dressing was contemplated, any further than was necessary to afford equable bearings to the arch-stones and fair junctures to those in the fronts of walls. In case bridges of a large size should be authorised, and embellishments of any description allowed, rustic facings were contemplated to be introduced in the wings, parapets, *voussoirs*, &c. of such bridges as the most expensive manner of finishing deemed advisable.

The dimensions fixed upon for walls required to sustain earthen embankments, were such that the thickness at their base

should be equal to one-third of the height of the embankment. The exterior slope or talus of such walls, was to be such as would result from a horizontal distance of one compared with a vertical distance of five, or as one to five. Where such walls were to be fortified by buttresses upon the outside, the distances between the buttresses was to be ten feet, and the thickness of the wall measured transversely through the buttress at its base, should be equal to two-fifths of the height of the embankment. In this case the thickness of the wall at top should not be less than two feet, and at its base, such as a slope of one to eight on the exterior of the wall, compared with a vertical interior, might occasion the exterior slopes of the buttresses, being in the proportion of one to five. The propriety of these slopes was inferred from a variety of observations in reference to the slope best calculated to resist permanently the thrusts produced in this climate by severe frosts.

Dry walls were deemed preferable, in all cases, to masonry laid with mortar or cement. The reasons of this preference were that the moisture occasionally and unavoidably collecting in the embankments sustained by the walls, would much more readily evaporate through dry walls, than through such as had their interstices closed by mortar. Also, that the walls themselves, if of the description last mentioned, would be liable to afford receptacles for water, which when frozen might fracture the wall.

3d. Of Earthen Structures.

These were to consist exclusively of embankments and fillings in abutments, which were to be formed in such a manner as to render them uniformly compact in all their parts. In order to accomplish these objects, the embankments were to be formed of horizontal lifts or strata of a convenient thickness. A more convenient mode was subsequently adopted, which consisted in the formation of two parallel ridges, one on either side of the embankment, which were to be carried up exteriorly in coinci-

dence with the assumed lateral slope of the embankment, while the space between the ridges was to be filled casually, by the earth precipitated from their summits. This mode of constructing embankments derives its utility principally from the circumstance of its affording a receptacle for all the water falling upon the site of the road, which is retained in the embankments, and contributes to its rapid and effectual consolidation.

The slope contemplated for the sides of the embankments, were to be such as are indicated by the hypothenuse of a triangle whose base is to its perpendicular, as two to three, or one to one and a half. The same slopes were also to be adopted for the sides of cuttings, in common earth or soil. On discovering that the principal part of the excavations were to be made in stiff indurated clay, a slope of one to one or forty-five degrees was subsequently preferred. Whenever the banks of cuttings were composed of such materials as to admit of a more abrupt slope, without endangering their stability, such a slope was admissible, however nearly it might approximate a perpendicular.

With respect to the time required for the consolidation of embankments, it was the opinion of the Board of Engineers that a period of at least four or five years would be required for that purpose, especially in cases where the embankment was of any considerable height. Accordingly it has ever been the intention of the Board to adopt wooden rails in such situations, with a view to the substitution of more permanent ones when the embankments shall have become sufficiently firm for their reception and support. A description of the permanent rails contemplated to be used upon the Baltimore and Ohio Rail-road, and the manner of laying them, has been explained in the "*Report of the Engineers on the Reconnoisance and Surveys*," pp. 59, 60.

4th. Of Brick Structures.

Although bricks have seldom been employed in this country, in the construction of bridges, yet from their successful applica-

tion in the construction of case-mates, bomb-proofs, &c. in our fortifications, and in that of subterranean sewers, in some of our principal cities, no doubts have ever been entertained by the Board of Engineers, as to the propriety of adopting them in the construction of the abutments, piers, arches, and parapets of bridges. With respect to their durability, the ruins of Babylon, Rome, &c. afford the strongest affirmative testimony. The bricks manufactured in the neighborhood of Baltimore are probably not surpassed by any in the world, and are every way comparable to those employed in the construction of the Sankey viaduct, or the Thames tunnel.

With regard to substituting brick for stone structures, it was satisfactorily ascertained that the cost of the former would not exceed nine dollars per thousand, which is about equivalent to four dollars and fifty cents per perch, of twenty-five cubic feet; and that bricks might be advantageously substituted for stone in all cases where the cost of the latter exceeded that price.

Moreover, it was mutually agreed upon by the Board of Engineers, all the members concurring, that the graded surface of the Rail-road should be twenty-six feet wide; which was deemed sufficient for the accommodation of two tracks, the necessary side drains, &c. Each track was to be four and a half feet wide between the rails, or five and a half inclusive of the rails. The space in the clear, between the tracks, was to be three feet wide, and a space of equal width was to be left on either side of the way, exteriorly of the rails; thus making the aggregate width of the road-surface twenty feet. On embankments an additional width of three feet on each side of the surface, just mentioned, was to be allowed in order to secure the road bed more effectually from any derangements resulting from abrasions, to which the exterior slopes of embankments were unavoidably exposed. A similar allowance was also to be made in cuttings below the natural surface, in order to afford sufficient room for a side drain on each side of the way. The same allowance was moreover to be made in *side cuttings*, in relation to which it was deemed advisable that a space six feet wide should be reserved

on the upper side of the road, to be occupied in part as a side drain, and at the same time as a berme or receptacle for the debris, &c. that might be precipitated from the sloping ground above; thus giving, in all the cases above enumerated, a uniform width of twenty-six feet for the graded surface of the road. To this width a space of eight and a half feet wide was to be added for each additional track that might be required as a *bolting track* or place of deposite.

Agreeably to a subsequent understanding in reference to the passage of the road upon rocky hill sides, where a substantial foundation of rock could be obtained, the width of the graded surface might be restricted to twenty feet.

While the surveys for the definitive location heretofore mentioned, and other preparations for the active commencement of the work of construction, on a respectable scale, were in progress, the powers, privileges, and responsibilities, to be delegated to the Superintendent were repeatedly discussed by the members of the Board of Engineers, without producing any change in the views already advanced in reference to this subject, at the conclusion of the preceding chapter. Col. Long was still strenuously opposed to the indulgence of the Superintendent, in the prerogatives he claimed. Mr. Thomas plead the urgency of the present state of the Rail-road affairs. The work must be commenced immediately. A Superintendent was at hand, prepared to enter upon the service, and believed to be competent to its management. It might be a difficult matter to procure another equally well qualified—at any rate, it would require more time than we had to spare for that purpose. He was willing to make any sacrifice for the maintenance of harmony among the officers and agents of the company. *He would not do any thing to offend Mr. Wever.* He would allow him to engage in the work upon the terms proposed by himself, (See Documents Q. and R.) regarding them as essential to the maintenance of a due ascendency on the part of the Superintendent over the contractors and workmen. He would concur in any limitation of the duties of the Superintendent that might be acceptable to the Board.

of Engineers whenever *a more favorable opportunity* should be presented for discussing the merits of the question, and prescribing rules definitive of the appropriate duties of that officer. Mr. Knight, as usual, acquiesced in the opinions of Mr. Thomas, and Col. Long was of course compelled to yield to the decision of the majority in reference to this subject.

As a palliation to the unpleasant predicament in which the agitation and decision of this question had involved Col. Long, he was generously allowed by the majority of the Board of Engineers, viz: Messrs. Thomas and Knight, to prepare instructions in accordance with the views of those gentlemen as above stated, for the guidance of the Superintendent in the performance of his duties; which instructions were prepared and submitted on the day following.

July 22, 1828. The instructions submitted by Col. Long, in reference to the duties of the Superintendent (See Appx. Doc. O.) were unanimously approved; all the members of the Board of Engineers being present.

In these instructions, the rules to be observed in clearing, grubbing, grading, bridging, &c. were distinctly stated, leaving however to the discretion of the Superintendent, a variety of duties which a majority of the Board of Engineers did not think it expedient to define. By a recurrence to the instructions (See Doc. O.) it will be perceived that the location and construction of bridges, of a span not exceeding twenty feet, were confided to the Superintendent, it having been contemplated by the Board of Engineers to adopt wooden structures in all situations where a greater span was required, and it having been deemed proper by a majority of the Board, to confide not only the location and construction, but also the planning of bridges of the size above mentioned, and of all smaller sizes to the Superintendent, who was regarded by that majority (Messrs. Thomas and Knight) as amply qualified for these purposes.

As before intimated, the slopes for deep cuttings, which were fixed in the instructions at the ratio of one and a half to one, or about

thirty-three degrees, were subsequently altered to an inclination of forty-five degrees.

Agreeably to these instructions, the Superintendent was required to submit to the Board of Engineers for their approval, a form for contracts for the execution of work upon the road, it having been submitted to his decision, whether separate forms, one for grading, &c. and the other for masonry, or a single form for both these descriptions of service, were preferable.

The Superintendent was moreover expressly required to "report to the Board of Engineers *monthly*, on the first day of each month, giving a *minute detail of his proceedings*, and whenever any thing occurred requiring additional instructions," he was required to "*address this Board for their directions and orders* in relation thereto."

In connexion with these instructions, the Superintendent was furnished with a copy of the printed "Regulations for the Engineer Department, as sanctioned by the Board of Directors of the Baltimore and Ohio Rail-road Company for his information and government in the discharge of his duties as superintendent of construction."

At the same meeting, July 22, Col. Long submitted a copy of a communication to Lieut. Gwynn (See Ap. Doc. P) in reference to an attempt which had been made to arrest the progress of the surveys for the Rail-road, which were then being made under the immediate direction of that officer, near the mouth of Bennett's creek, by a person who professed to be a civil officer invested with authority for that purpose; it having been alleged that pending the injunction obtained against the Rail-road Company, by the Chesapeake and Ohio canal Company, the former had no right to prosecute surveys upon ground that might be required for the purposes of the contemplated canal.

July 31, 1828. The superintendent this day submitted a form of contracts for grading upon the Baltimore and Ohio Rail-road, which is published at full length in the appendix. (See Doc Q) on the day following.

August 1, 1828. The Superintendent also submitted a form-

of contracts for masonry on the Rail-road. (See Appendix Document R.)

The views and purposes of Mr. Wever, in relation to his appropriate duties, were now clearly disclosed, and proved more arrogant and obnoxious than could have been anticipated. The powers he claimed were of the most absolute and arbitrary nature. Both of the forms presented were equally characterised by an eagerness for exclusive control, on the part of the superintendent, in relation to all the operations in which he was to be concerned. He was to be recognised as sole arbiter in all cases where a discretionary power was to be exercised, and these cases were multiplied in such a manner as to embrace every object specified in the contract." The clearing, grubbing, and grading of the road, its dimensions and position in all respects, the dimensions, form, and manner of construction for bridges, culverts &c., the final measurement and acceptance of the work when finished, and in fine, all things in relation to the times of commencing and completing the works, the assesment of damages on any account, the payments on account of work done, the penalties for non-compliance with his directions, &c. &c. were cognisable before his sole and exclusive umpirage.

These forms gave rise to much warm debate, in reference to the manner of dividing and distributing the various responsibilities incident to the Engineer service of the Rail-road Company, and especially in reference to those that ought to be confided to the Superintendent. Mr. Thomas was desirous of vesting in this individual the entire responsibility of all the fiscal concerns of the company, so far as they related to the grading and masonry required in the construction of the Rail-road. He was willing to clothe the Superintendent with full power to make contracts and to carry them completely into effect, without any interference on the part of the Board of Engineers. He deemed the authority, supervision, and control, contemplated to be vested in the Superintendent agreeably to the forms under consideration, essential to a proper and efficient discharge of the duties of his station. He

moreover observed that the Board of Engineers had a multiplicity of far more important duties devolving upon them, and that in consequence, they ought to be exempt from the troubles incident to the making of contracts, settling with contractors, &c. &c., and was decidedly in favour of an approval of the forms. Mr. Knight had no particular objections to an approval of the forms by the Board of Engineers. He admitted that the authority of the Board of Engineers was not recognised in them, but this was of no consequence, inasmuch as the Superintendent derived all his authority from the Board of Engineers. He was not greedy of authority, and never had been, nor was he in this case desirous of more authority than that recognised as belonging to the Board, from the circumstance that the Superintendent was indebted to this Board for the office he filled, and was of course amenable to the same, for a correct discharge of his duties, which must be done in conformity to instructions emanating from the Board of Engineers. He did not like one of the privileges contemplated in the forms for grading, viz: that of changing the location at the pleasure of the Superintendent; but on the statement of Mr. Wever, that nothing more was contemplated by this provision, than such a change as might obviously render the direction of the road more straight and its construction less expensive, Mr. Knight waived all objections to the forms.

Col. Long contended that an approval of the forms on the part of this Board, would be equivalent to an entire surrender of all their powers and authority, in reference to the execution of the most important duties assigned them. That, however willing they might be to confide to others the management of the work of construction, they could not in this way absolve themselves from the heavy responsibility imposed upon them by the regulations prescribed for their government, and that however lightly the Board might think of this responsibility, they must and would unavoidably be accountable, in the estimation of the stockholders and the public, for all the errors that might be committed in the construction of the road, and all the mistakes that

might occur subversive of economy, in the application of the funds of the company.* He moreover adverted to the circumstance, that neither the authority nor even the existence of the Board of Engineers was recognised in the forms under consideration, and proposed as a means of rendering these instruments less objectionable, that the word "Superintendent" should be stricken out in several instances, and the "Board of Engineers" substituted therefor. This proposition was negatived by the majority consisting of Messrs Thomas and Knight. Col. Long then gave it as his opinion, that an approval of the forms would lead to a complete abrogation of the authority of the Board of Engineers, and eventually to a dissolution of that body, and that were such a measure adopted by this Board, it would amount to nothing short of an attempt to deprive themselves of an associate existence.

August 2, 1828.—The forms presented by the Superintendent being still under consideration, it was finally settled in conformity to the decision of the majority, viz: Messrs. Thomas and Knight, that they should be returned to the Superintendent, with the understanding that he was at liberty to make any arrangements that he might deem necessary to the execution of the duties assigned him; and that, for this purpose, he might adopt these or any other forms he pleased, *not incompatible* with the instructions given by this Board, under date of July 22d, until more appropriate forms should be prescribed by the Board of Engineers. By this measure, which, as has been stated, was passed by a majority of the Board, Col. Long constituting the minority, the business of making contracts was effectually confided to the Superintendent, the Board of Engineers disclaiming for the present, any control in reference to them, and leaving to Mr. Wever the entire management of the work, without a guar-

* This prediction has actually been verified. The mistakes committed on the work, and the lavish expenditure of many thousands, are at this time laid to the charge of the Engineers, although they have virtually been excluded from any participation in matters of this sort.

antee for the faithful performance of his duties, and virtually absolving him from all accountability to the Board of Engineers.

It was known that the Superintendent had caused a large number of blank forms to be printed, precisely of the import of those submitted; and it was believed that these forms, instead of *mere verbal understandings*, were employed in concluding the various contracts subsequently made in reference to the grading and masonry on the road.

August 18, 1828.—Instructions were this day given to Col. Long's party, directing the survey of a route commencing at Grimes' spring, descending along the valley of the Linganore creek, passing through Fredericktown, and terminating at the Point of Rocks; also of another route, *via.* the valley of Bush creek. The instructions given, are exhibited in the Appendix, (See Document S.)

August 25, 1828.—Instructions were also given to Capt. McNeill, who had now nearly completed the location from Baltimore to Ellicott's mills, relative to a further prosecution of the location in the valley of the Patapsco, above the point last mentioned. These instructions are exhibited in the Appendix. (See Document T.)

The location had already been so far accomplished, that the Superintendent was enabled to divide the route from the first stone to the point of its intersection with the Frederick road, at Ellicott's mills, which was now to be denominated the first division of the Rail-road, into sections of about half a mile each, which were numbered from one to twenty-six; beginning at the point first mentioned. The farming out of the grading and masonry for construction, took place about this time, in conformity to this subdivision, upon such sections as could be disposed of for that purpose, at what was deemed a fair price, offers having been made and accepted for most of the sections.

On or about the 26th of August, Mr. Knight took his departure from Baltimore, on a visit to his family, resident near Brownsville, in the State of Pennsylvania; and the Superintendent, Mr.

Wever, set out on a journey to Ohio, about the same time, for the purpose of removing his family to Baltimore.

About this time, arrangements were made for the accomplishment of an object which had for a long time been eagerly cherished by the most influential friends of the Rail-road. The object adverted to, was the acquisition of the latest practical information from England on the subject of Rail-roads, for the attainment of which a deputation was to be sent thither, consisting of such persons as might be designated by the Board of Directors.

In the mean time Capt. McNeill, at the request of Mr. Wever, undertook the superintendence of the works which were now commenced, and continued in the discharge of the duties of the Superintendent till the date of that officers return.

As yet, very little had been done in this branch of the service. Candidates for contracts, whose proposals had been accepted, were daily presenting themselves and entering upon the work of construction. Contracts were to be concluded, directions were to be given, in relation both to the *grading* and *masonry* and demarcations, showing the extent to be occupied by cuttings, fillings, bridges and culverts, upon the natural surface of the ground, were yet to be made. The number of workmen that could be advantageously employed on different sections of the road; to be decided on, &c. &c. All these arduous duties now devolved on Capt. McNeill, who availed himself of the assistance of Lieut. Barney, to whom he assigned the duty of defining widths of cuttings, and fillings upon the natural surface, of Lieut. Dillahunty, who was employed in measuring and computing the amounts of cutting and filling on the line of the road: and of Mr. Robert Wilson, a young man employed by Mr. Wever, as agent of masonry, to whom was assigned the business of locating bridges, culverts, &c. and defining the sites to be occupied by them. All this was left entirely to the discretion of Capt. McNeill; no instructions, either written or verbal, having been given him by the Superintendent. Capt. McNeill had even yet to learn that instructions had actually been furnished by the

Board of Engineers to the Superintendent for his government in the Rail-road service, and knew nothing of them till they were exhibited to him by Col. Long, subsequently to the departure of the Superintendent. The agent of masonry knew as little of these, or any other instructions, as did Capt. McNeill; every thing having been left entirely to the direction of that officer, in relation to the duties he should perform, and the manner of performing them. Nor does it appear that any notice had been taken by the Superintendent, of the instructions given by the Board, on the 22d July, (Document O.) inasmuch as he never officially apprised the Board of his having received them, and never communicated their provisions to the officers or agents in his employ. In truth, he had never perused or had purposely disregarded and disobeyed them.

The double duty of superintending the construction and the location, was now performed by Capt. McNeill, who occasionally received the co-operation of Col. Long, when the office and other duties of the latter, which required his occasional presence with his party in the neighborhood of Fredericktown, would permit. Several contracts were concluded by Capt. McNeill, in his capacity of acting Superintendent, in the terms of the printed forms prepared by the Superintendent, with a few slight alterations.

September 1, 1828.—The Board of Engineers this day passed and approved several estimates, among which was one by Capt. McNeill, as acting Superintendent, calling for fifteen thousand dollars to cover the expenditures of the current month, on account of construction; which was the first estimate presented in reference to this branch of the service.

September 9, 1828.—The President of the Company communicated to this Board, a resolution passed by the Board of Directors, enjoining despatch in the location now in progress above Ellicott's mills; which was acted upon by this Board, and ordered to be carried into effect by Capt. McNeill, conformably to the instructions heretofore given in relation to this service. (See Appendix Document T., before cited.)

At the same meeting, Col. Long submitted certain maps and profiles, received from Lieut. Gwynn, illustrative of the surveys made in the valleys of Bennett's and Bush creeks, with a view to a system of inclined and horizontal planes, extending from Parr Spring ridge to the Monocacy.

Col. Long had for some time devoted his attention to the investigation of the various methods of tracing curves upon the ground, with the view of ascertaining which was entitled to a preference in its application to field operations, and especially to the definitive location of a serpentine Rail-road. He aimed at the adoption of a method, which in its application would exempt the operator from the delay usually attendant upon the tracing of curves in field surveys, in consequence of the numerous intricate calculations usually required for that purpose. His investigations led to the adoption of a method "depending on the relations subsisting between various chords, their versed sines and tangents to their arcs, and comprising a variety of geometrical illustrations and deductions, applicable in tracing the route of a Rail-road." (See First Annual Report of the Board of Engineers, p. 17.) A series of tables was prepared as an essential appendage to this method, by an appropriate use of which, all the computations heretofore required in the field, might be dispensed with. The method was subsequently published at full length in a treatise entitled the "Rail-road Manual," to which reference is respectfully made for a satisfactory explanation of the subject. The rules therein contained have subsequently been adopted in the prosecution of all the surveys made since the publication of the treatise, on account of the Rail-road, and in reference to its definitive location.

In conformity to the regulations for the Engineer Department, (See Art. 2d, of Doc. L.) a report is due annually in the month of September, from the Board of Engineers to the President and Directors of the Rail-road Company. The duty of preparing this report now devolved exclusively upon Col. Long, who engaged in its compilation at a late date, having been previously occupied on other indispensible duties.

The confusion into which the affairs of the company had been unavoidably thrown, in consequence of the precipitation and hurry hitherto attendant upon their field operations, and especially the embarrassments which already began to be felt, even at this incipient state of the work, for want of suitable returns, projects, &c. from the Superintendent of construction, contributed to render the framing of the first annual report of the Board of Engineers, a very arduous and difficult task. In the performance of this duty, however, Col. Long experienced great relief as well as important aid from Capt. McNeill, who was at that time acting in the capacity of Superintendent, and promptly communicated the requisite information, touching the prices at which the different portions of the work had been farmed out for construction, the progress made in the work, the character of the contractors, &c. &c.

CHAPTER III.

Brief review of the First Annual Report of the Board of Engineers.—Reasons of certain opinions therein advanced.—Certain inaccuracies explained.—An exhibit of the estimated cost of the First Division.—The cost at which it might have been graded, and its known cost.—Remarks on the character and import of Quarterly and Monthly Returns, &c.—Appointment of Capt. McNeill as a member of the Board.—Deputation to England. —Tunnel to be constructed.—Location to be made at the Point of Rocks, &c.—Location of the Second Division completed, and the work farmed out for construction.—Records of the Board silent upon this subject.—Col. Long appointed President of the Board.—Report on the admission of a summit at the Deep Cut.—Instructions furnished to the gentlemen of the Delegation. —Preparations for a Wooden Viaduct across Gwynn's falls. —System of accountability attempted to be adopted.—Commencement of the work at the Lower Point of Rocks.—The Board of Directors approve the adoption of Wooden Bridges.—Returns of Superintendent defective.—The decision of the Directors on the adoption of Wooden Bridges reversed.—Exhibit of the comparative cost of wooden, stone, and earthen structures, based upon various data.—Plans for Bridges.—Duty of the Board to make them.—Claimed as the privilege of the Superintendent.— Grading at the Point of Rocks.—Speculations on Tunnel.

The First Annual Report of the Board of Engineers having been prepared and approved, was submitted under date of September 30, 1828, and was immediately put to press by the Pre-

sident of the Company, in order that copies might be prepared for distribution at the next monthly meeting of the Board of Directors, which was to take place on the first Monday of the ensuing month. Mr. Knight, who had been absent about five weeks arrived in time to examine the report and annex his signature to it, prior to the printing of the last sheet.

In this document were succinctly discussed the several topics enumerated in the 2d article of the regulations (Doc. L.) together with such other subjects in relation thereto, as were deemed proper for consideration. References were also made to numerous subordinate documents, detailing a variety of particulars relating to the several subjects treated of. The reasons heretofore cited for authorizing and adopting the location of the road, as made by Capt. McNeill, in the neighbourhood of the city and especially those upon which a preference for an elevation sixty-six feet above mean tide, was grounded, are distinctly stated in this report. (See First An. Rept. of Engrs. p. p. 4, 5, 6.)

The manner of executing surveys; the principles that should govern in the location and construction of the road, the mode of construction in reference to grading and bridging, the mode of constructing and laying rails, &c. &c. as recommended by the Board of Engineers were clearly explained in this report, (See same Report, p. p. 15 to 22.)

In this report are also exhibited various statements and opinions in reference to the probable cost of different parts of the work; many of which, subsequent experience has shown to be inaccurate. We shall accordingly take this opportunity, to offer such explanations as are deemed necessary to a full and clear exposition of the nature and origin of the inaccuracies alluded to.

From a great variety of personal observations, in reference to the cost of roads in different parts of the country, Col. Long had formed the opinion, that the cost of grading and bridging for a Rail-road, exclusive of any covering or pavement, would not in ordinary cases exceed seven thousand dollars per mile. Mr. Knight concurred in this opinion. Mr. Thomas thought that the actual cost would be less than half that amount.

The only means by which the Board could estimate the actual cost of grading and bridging on the first division of the Rail-road, were the prices at which the work had been farmed out for construction. Agreeably to these prices which, prior to the date of the Report, had been deemed fully adequate to the purposes for which they were intended, an allowance of $3000 having been made for a wooden viaduct two hundred feet long across Gwynn's falls, of $15,000 for a wooden viaduct one thousand feet long across Gadsby's run, and of $5000 for a similar structure three hundred and thirty-three feet long across Stillhouse run, the average cost of grading on the route from the first stone to Dorsey's run, seven and a quarter miles, would have been $23,855 per mile, as stated in the report. Pursuing the same mode of computation, and including the cost of a wooden viaduct across the Patapsco, estimated at $4,500, and a similar structure across Dorsey's run two hundred feet long, estimated at $3000. The average cost of grading and bridging from Dorsey's run to Ellicott's mills, four and a half miles, would have been $5,610 per mile. Comparing these two results, it will appear that the average cost per mile for grading and bridging on the first division of the Rail-road, would be about $17,000 as stated in the Second Annual Report of the President and Directors, p. 7.

At the time of submitting the report under consideration, the location had been extended a short distance only above Ellicott's mills, and had for the most part been made upon ground remarkably favourable for the reception of the road. Such were the facilities presented, that a sanguine belief was entertained, that the cost of grading and bridging on the entire distance from Ellicott's mills to the forks of the Patapsco, exclusive of two wooden bridges across that stream and its north fork, would not exceed $3000 per mile. This opinion received additional strength from a comparison of the difficulties on the route below Ellicott's mills, which were to be overcome at an average expense not exceeding $5,610 per mile, with those of far less magnitude, which were presented on the route above that point.

Similar considerations induced an estimate lower than it should have been, on various other parts of the route from the forks of Patapsco to the Point of Rocks. No definitive location had yet been made on any part of this distance, and of course no definite conclusions could be drawn as to the actual amount of work to be done. Such conclusions could only be based on computations embracing the quantities of earth to be removed, the number and dimensions of culverts, bridges, &c. and the quantity of masonry required in their construction. None of these data had as yet been obtained on any part of the route from Ellicott's mills to the Point of Rocks.

With regard to the estimates, relative to the cost of various other items of construction and materials, as exhibited in the report, they were founded on the best information that could be obtained at that time, and were no doubt defective in many respects. Among the items alluded to, are included iron rails, which have been procured at a cheaper rate than had been anticipated, the sleepers, and wooden rails, and their transportation, as also the laying of wooden rails, which have proved more expensive—to which may be added the branch-rails, and switches, *viafuges*, &c. which were inadvertently omited in the estimate.

In order to afford a concise and satisfactory view of the prospects under which the work of construction was commenced, and of the developements that have subsequently taken place, affecting those prospects; also for the purpose of exhibiting in a clear light, the nature, reasons, and magnitnde of numerous discrepancies discoverable in the results produced, when compared with those anticipated in the report under consideration, a series of tabular statements has been compiled from sundry documents in the possession of the authors, in which is set forth a variety of details in reference to these subjects. (See Appendix, Doc. W.) This document contains, opposite to the designation of each section of the first division, the estimated amount of work required for the grading, masonry, and other items of construction necessary for the completion of the section, or its preparation for paving and railing. This amount is expressed in cubic yards, poles,

running measure, perches of masonry, &c. &c. according to the manner in which the work was farmed out for construction. The prices at which these several items of work were proposed to be done, and the aggregate cost of each section as deduced therefrom, are annexed to the several sections. The prices at which it is understood that these several items could be executed, and the aggregate cost agreeably to these prices, are also annexed in the same order. Moreover, the cost known to have been incurred in the grading and bridging of this part of the road, is exhibited in the same order in a separate department of this document. To the several statements contained therein, are added such explanatory remarks as were deemed appropriate.

In reference to certain portions of the first division, and in further explanation of the nature of the work, and the unforseen difficulties attendant upon its execution, as also in illustration of the influence these difficulties have had upon the cost of construction, a few additional remarks will here be offered.

1st. The price at which the first section was proposed to be graded, exclusive of the bridge site which embraced the entire distance across the valley of Gwynn's falls, was thirteen and a half cents per cubic yard; whereas its actual cost may be estimated at sixteen cents, the earth having been more difficult to remove than had been anticipated.

2d. The price for grading the second section, which embraces the deep cutting at the Washington road, was originally fourteen cents; its actual cost may be estimated at twenty-two cents per cubic yard. The reason of this difference is, that the excavation was to be made in an adhesive indurated clay far more difficult to be removed, than had been anticipated. On this section the construction of a bridge was to be provided for, on which the Washington road must be conducted across the Rail-road. The cost of this structure was moreover greatly enhanced, in consequence of an expensive counter arch, and other masonry indispensably requisite to the support of the banks of the cutting at this place, and was made up of the following items, viz: counter-arch, inclusive of stone rails $656; abutments $924; bridge

and covering one thousand six hundred and seventy dollars; which sums are to be included in the actual expense of the work, together with the expense (amounting to about five hundred dollars) of sundry unsuccessful efforts in preparing for the construction of a tunnel at this place, which were rendered ineffectual, in consequence of the occurrence of quicksands and springs of water.

3d. The reputed contract price, for which the deep cut on the fourth and fifth sections was undertaken, was eighteen cents per cubic yard; which, at the date of the report, was believed to be adequate to the accomplishment of that work. Owing to a variety of unexpected contingencies, however, such as the unusual hardness and tenacity of the earth, in which the excavation was to be made; the inclemency of the season in which a large portion of the work was to be done; the imprudence of prosecuting the work by night, when it was found to be far more expensive than the same would have been by day-light; the collection of a greater force than could be employed to advantage, &c. &c.; the actual cost of this part of the work, was unavoidably enhanced to a much greater price. With proper management, and under favorable circumstances, by which we would be understood to mean the observance of system, and the introduction of ordinary labor-saving machines in the prosecution of the work; as also the choice of a season for the operations, when the days were at least of equal length with the nights, the weather more mild, and the ground less frozen or muddy, than they proved to be from December to March, inclusive, there is no doubt that the excavation of this huge cut, might have been effected at an expense not exeeeding twenty-five cents per cubic yard. But making all due allowance for the untoward circumstances attendant upon this part of the work, it certainly ought to have been executed, and might have been accomplished in due time, at the average cost of twenty-eight cents per cubic yard.

4th. The seventh section was originally let for sixteen cents per cubic yard. Twenty-nine thousand eight hundred and seventy-five yards of embankment were farmed out at this price,

when the job was taken from the individual to whom it was originally let, and the residue, viz: fifty thousand eight hundred and ninety-eight cubic yards were relet for eighteen cents per yard. This price would have been adequate to the accomplishment of the work, but for an unexpected slide of earth from the Mine-bank hill, which caused an additional expenditure of about two hundred dollars.

5th. The eighth section was to be graded for twelve and a half cents per cubic yard; but proving more difficult than had been expected, the price was raised to fifteen cents per yard.

6th. The price proposed for grading the thirteenth section was thirty dollars per pole, running measure. The work proved more difficult than had been anticipated, and the price was subsequently raised to forty-five dollars per pole.

7th. Sections eighteen, nineteen and twenty, were originally let for twenty-seven dollars and fifty cents per pole, running measure; but owing to the extreme ruggedness of the surface over which they passed (traversing the Buzzard rocks) their price was raised to thirty-four dollars per pole.

8th. The original price for grading the twenty-first section was thirteen and a half cents per cubic yard, which was, from the beginning, deemed insufficient. It was subsequently raised to fifty-five dollars per pole, and farmed out in connexion with the Patapsco bridge. No doubts can be entertained as to the adequacy of this price, when it is understood that the excavated materials are principally stones, which could be employed to great advantage in the *backing* and *filling* for the bridge which occupies a part of this section.

9th. The twenty-second, twenty-third, and twenty-fourth sections were originally let at seven dollars and fifty cents per pole, running measure. But in consequence of difficulties that were not duly appreciated by the persons to whom they were let, the price of the first was subsequently raised to eleven dollars and fifty cents; and of the others, to nine dollars and fifty cents, which have been found adequate to the purpose.

10th. The twenty-fifth and twenty-sixth sections were farmed out to the same persons at ten dollars per pole each. But, for the reason above intimated, the price of the twenty-fifth was raised to eleven dollars and fifty cents; and that of the twenty-sixth to fifty dollars per pole. The great difference in the original and final prices of the latter, is attributable to a difficult and expensive excavation in solid rock which occurred on this section.

In regard to the masonry, generally, on the first division, it should be distinctly understood, that the most expensive parts of it—such as the arches, the facings, and other range-work, were never contemplated to cost more than four dollars and fifty cents per perch; inasmuch as it was known to us, and made known to others, that all such parts could be formed of brick at that price. It should also be distinctly understood, that no hammer-dressing on the exterior of bridges, nor other embellishments that were not essential to the stability and permanency of the work, were ever intended by the Board of Engineers to be introduced. The highest finish ever aimed at by them, was substantial rubble-work securely and neatly laid; and they disclaim ever having authorised or sanctioned the faced work and other embellishments *intended* for ornament, which are to be observed in most of the bridges erected along the Rail-road, and which are altogether incompatible with the views of this Board, as repeatedly explained to the Superintendent.

The stone required for the masonry on that part of the first division, situated between Baltimore and the valley of the Patapsco, could not be procured within a distance less than two to four miles from the work. Proposals were nevertheless made for its delivery in any quantities that might be required on that part of the route, at the rate of one dollar and twenty-five cents per perch of twenty-five cubic feet. A large proportion of the stone was required at a season peculiarly unfavorable for its transportion; in consequence, the price for delivering it, was in most instances raised to two dollars and twenty-five cents. Proposals were also made for laying the stone thus delivered, at

the rate of seventy-five cents per perch, and much of the work was done at this rate. But in consequence of dressings and facings required by the Superintendent, independently of any authority from the Board of Engineers, the cost of laying was greatly enhanced in numerous instances. By these means the aggregate cost per perch, for different kinds of masonry, varied from three to ten, and in some instances even to *fifteen dollars.*

The document above cited, (See Appendix Document W.) exhibits the quantity of masonry contained in the stone bridges originally contemplated, the prices at which they were to have been built; the prices at which they might have been built; together with the actual cost of those that have been built; as also, the localities, extent and cost of wooden bridges, that might have been advantageously substituted for stone structures, the latter of which, have greatly enhanced the cost of the Rail-road.

The cost of grading and bridging on the first division of the Rail-road, agreeably to the original estimate, contained in the first annual report of the Board of Engineers, was one hundred and ninety-eight thousand one hundred and fifty-seven dollars, or sixteen thousand nine hundred and fifty dollars and ninety-eight cents per mile.

The cost at which the first division might unquestionably have been completed, inclusive of grading and bridging, and prepared for paving and railing, if executed in conformity to the views and intentions of the Board of Engineers, would not have exceeded two hundred and sixty-two thousand eighty-seven dollars and five cents; or, twenty-two thousand four hundred and nineteen dollars and seventy-seven cents per mile.

This last result has not been predicated on the actual cost of the various items which have been introduced into the account of construction, covering innumerable expenditures incurred in consequence of mismanagement;—of the adoption of plans for bridges &c. incompatible with economy; and of an ill-timed choice of the season for carrying on the work; but upon the supposition that a more prudent and economical mode of managing the work of construction might have been adopted, providing for the introduction and use of such labour-saving apparatus, as had

been found beneficial in other similar works; the adoption of rubble work in the construction of bridges and culverts, which would have proved equally as durable, and far less expensive than the faced work, and other costly finishing displayed in the bridges that have been constructed; the seasonable appointment, and judicious distribution of the forces employed on the road, together with the constant personal supervision of a skillful Superintendent, well versed in the most approved management of the concerns entrusted to his care.

The enormous expenditures that have been incurred on the first division of the Rail-road, in consequence of the mismanagement and abuses above alluded to, are also presented in the same document, (See Document W.) which exhibits the several sums known to have been expended, or actually required on the sections to which they are respectively annexed. It should not be inferred however, that the sums therein stated, have proved adequate to the accomplishment of the objects designated, for it is believed that the amount actually expended on those objects, exclusive of what may be required for their final accomplishment, considerably exceeds that exhibited in the document referred to.

The amount actually expended on the first division, on account of grading and masonry, as per Document W. just cited, is five hundred and thirty-one thousand six hundred and ninety-eight dollars and forty-six cents.

And the average cost per mile for the grading and bridging on this part of the road is forty-five thousand four hundred and eighty-three dollars and eighteen cents.

Resulting in a difference between the actual cost of grading and bridging of the first division, and that for which it is believed these items might have been accomplished, amounting to two hundred and sixty-nine thousand six hundred and eleven dollars and forty-one cents; or, twenty-three thousand sixty-three dollars and forty-one cents per mile.

This difference is believed to be attributable exclusively to the substitution of stone bridges, instead of wooden structures,

as recommended by the Board of Engineers, and to indiscreet management in the superintendence of the work. Of this however, the reader will be able to judge from an examination of the prices, &c. as exhibited in the appendix (See Document W.) and by comparing them with the difficulties attendant upon the work, as explained in various parts of this narrative, and the documents herein referred to.

In connexion with the first annual report of the Board of Engineers, was submitted a hasty comparison of the cost of stone bridges and embankments, contrasted with wooden structures, which were contemplated to be adopted at the crossing of Gwynns' falls, Gadsby's, and still-house runs, &c.; agreeably to which, the difference resulting in favour of the contemplated wooden structures, was fifty-four thousand six hundred and forty-five dollars and seventy-four cents; (See Appendix Document X.) However striking this difference may seem, it will hereafter appear, that the actual difference amounted to more than double that sum.

In conformity to a provision in the charter of the Company, the Rail-road year commences on the first of October, and terminates on the last of September; and in conformity to the second article of the regulations of the Engineer Department, (See Document I.) the Board of Engineers were required to report not only, on "the progress of the operations of the Engineer Department, during the preceding year," but also, to furnish a project for carrying on the operations during the ensuing year, accompanied by an "approximate estimate of the expense" attending them. Accordingly the report under consideration, contained a general designation of the objects claiming the attention of the Engineer Department, during the year beginning on the 1st October, 1828, and ending on the 30th September, 1829, together with the probable expense of accomplishing the several objects designated. The aggregate amount thus called for, to meet the expenditures of the year, was seven hundred and five thousand two hundred and forty-eight dollars.

Taking this for the aggregate amount to be expended during the year, the mode of appropriating it, agreeably to the provisions of the regulations, (See Document L.) was briefly as follows: Projects for carrying on the operations contemplated in the annual report as above intimated, and peculiar to any department of the Engineer service, were to be furnished at the commencement of each quarter of the ensuing year, by the officer charged with the superintendence of the operations in such department. These projects were to embrace in general terms, the nature and extent of the operations, the time, probable force, and other means required for their accomplishment, &c. &c. Subordinate to these quarterly projects, monthly estimates were required, exhibiting in detail, the various items of expenditure for the current month, their probable cost, the force and means required for the accomplishment of definite objects,—the progress and cost of the work done during the preceding month, the objects to which the funds previously placed to the credit of the disbursing officer had been applied, and the balance still remaining to the debit or credit of the disbursing officer.

The monthly estimates were to be accompanied by monthly reports, explaining clearly the progress made in the operations, the facilities, or difficulties attendant upon them, the results whether satisfactory or otherwise, to which they may have led, and in general giving such information in regard to the progress and condition of the work, as would afford a clear view of the nature and exigencies of the service.

The quarterly projects adverted to, so far as they related to field surveys, &c. were dispensed with, inasmuch as no individual operation in this branch of the service had been set on foot, which was likely to require more than a month or six weeks for its accomplishment. The officers charged with the superintendence of surveys, &c. received special instructions from time to time from the Board of Engineers, particularly designating the route to be surveyed, or located, and the manner in which this or that particular service should be performed. Accordingly, monthly estimates and reports were all that could be required or

rendered; and these were regularly prepared and submitted, and contained all the information called for, even to a designation of all the distances measured, the number of stations made, the amount of detentions by unfavourable weather, &c.

The quarterly projects relating to the construction of the road, could not with equal propriety be dispensed with, inasmuch as the sums to be expended were incomparably greater, and must be provided for by occasional calls on the part of the Directors, for the payment of instalments. Nor would there have been any difficulty in estimating beforehand the forces proper to be employed during any quarter of the year, or the amount required to compensate them for their services.

No such project, however, was submitted by the Superintendent, although a copy of the regulations for the Engineer Department had been furnished him for his "information and government."

The monthly estimates on account of construction, setting forth the objects on which expenditures had been made during the preceding month, the amounts respectively expended thereon, and those to be expended thereon during the current month, as also any new objects calling for expenditures; and the monthly reports which were required to accompany these estimates, showing what has been done during the past, and what is expected to be done during the current month, and "giving a minute detail of all the proceedings" relating to the work of construction, were deemed indispensable to an adequate understanding of the nature and progress of the work, and of the economical disposition of the funds appropriated for its advancement.

The respect and consideration paid by the Superintendent to these wholesome regulations, and to the various explanations given of them in the numerous instructions of the Board of Engineers, subsequently issued to that officer, or rather his total disregard and indifference concerning them, will further be made to appear in the subsequent pages of this narrative.

Oct. 13, 1828. The following communication from the President of the Rail-road Company, was this day submitted to the

Board of Engineers. Mr. Knight having returned on or about the 1st of the month, and all the members being now present.

OFFICE OF THE BALTIMORE AND OHIO RAIL-ROAD COMPANY,
"*October* 6, 1828."

"Gentlemen,

At a meeting of the Board of Directors of the Baltimore and Ohio Rail-road Company this day, Capt. William G. McNeill was appointed a member of the Board of Engineers, of which I am instructed to inform you."

"I am also desired to acquaint the Board of Engineers, that the Directors of the Company having heretofore determined to send a deputation to England, for the purpose of gaining information, relative to the most approved construction of Rail-roads in that country, and the application of a moving power upon them, this day appointed Jonathan Knight, Esq. and Capt. Wm. G. McNeill to that service. The Board have likewise instructed me to make application to the United States' government for permission to engage Lieut. Geo. W. Whistler, as assistant Engineer to those gentlemen."

"It is the desire of the Board of Directors, that the earliest possible measures may be taken, to commence the actual construction of the Rail-road at the "Point of Rocks," as suggested in the First Annual Report of the Board of Engineers, this day submitted to the Directors, and I am especially desired to call your attention to this object."

Signed, P. E. THOMAS,
President of the Baltimore and Ohio Rail-road Company.

The Board of Engineers had already been apprised of the contemplated appointment of Capt. McNeill to a membership. On communicating the decision of the Directors in reference to the organization of the mission to England, the President of the Company exhibited a paper purporting to be the report of a committee appointed by the directors, to organize the deputation, in which it was stated that the services of Col. Long could not at this time consistently be dispensed with, inasmuch as

his acquirements and experience, which had been of longer standing than those of his colleagues, rendered him more familiar with the management of the concerns of the Rail-road, which must be rigorously prosecuted during the absence of the other members of the Board of Engineers.

In reference to the change which was now to take place in the organization of the Board of Engineers, a few observations are deemed necessary in this place, in order to acquaint the reader more fully with the peculiar kind of policy which now begun to prevail in the management of the affairs of the company, and which it is believed had for its final object, the dissolution of the Board of Engineers, as accomplished on the 4th of January last; and the consequent investment of their power in the hands of Jonathan Knight and Casper Wever.

At an interview which took place between Col. Long and Mr. Knight, a short time prior to the original organization of the Board of Engineers, it was mutually agreed between them at the suggestion of Mr. Knight, that they would oppose the introduction of any additional members into this Board. This understanding had no personal allusion whatever, and was predicated solely on the ground, that Boards established for almost any purpose, were more or less subject to collisions of opinion among their members, and that these collisions are often subversive of a harmonious co-operation in the transactions for which they were instituted. Differences of opinion must be expected to arise, and the organization then contemplated, viz: A Board of Engineers, consisting of three members only, was such as would be likely to preclude a variety of evil consequences that might result from a more numerous association. The two professional members of the Board might entertain different views with respect to the measures proper to be adopted, and might not be able to arrive at a harmonious decision as to the course to be pursued. In such a case the considerations by which they were respectively influenced, would be explained before the Board, and the President of the Company who was ex-officio a member of the Board, on hearing their explanations, would be able to decide

the question by his casting vote, in favor of the one or th other.

Notwithstanding the agreement above alluded to, which wa made between Col. Long and Mr. Knight at the beginning o their personal acquaintance with each other, Mr. Knight had without the knowledge of the former, not only consented to th introduction of Capt. McNeill as a member of this Board, bu had never communicated the fact to Col. Long, who knew no thing of the measure thus concerted, and which was proposed for adoption in the absence of Mr. Knight until he had felt himself constrained, in good faith to that gentleman, to oppose the introduction of Capt. McNeill.

To Capt. McNeill personally, Col. Long could have no objection. His intelligence and honor were desirable acquisitions to the Board of Engineers; and Col. Long could see in his accession to it, only that of a valuable colleague and friend upon whom he could with confidence rely for support in whatever was justifiable and correct, as the event fully proved. On learning that Mr. Knight was not opposed to the introduction of Capt. McNeill, but was actually in favor of it, Col. Long at once waived all his objections to the measure.

On the receipt of the communication above recorded, the Board of Engineers passed sundry resolutions, relative to a commencement of the work of construction at the Point of Rocks; to a tunnel under the Washington road, at the place where it crosses the Rail-road, on the second section of the first division; and to the admission of a summit elevated nine feet above the grade heretofore established at the deep cut, in relation to which a committee consisting of Col. Long, Mr. Knight, and Capt. McNeill, were appointed and required to report thereon. These resolutions are exhibited in the Appendix (Document Y.)

In conformity to the views and instructions of the Board of Engineers, as expressed in their proceedings of this date, (See Document Y. just before cited) Col. Long repaired to Fredericktown for the purpose of making the arrangements necessary the accomplishment of the objects therein contemplated.

His party had nearly completed the field-work heretofore assigned them, and were ready to engage in other duties. Instructions were accordingly prepared by him for their guidance in making a definitive location of the road from the lower to the upper Point of Rocks, in the immediate valley of the Potomac, and from the point first mentioned to Chapel ridge, embracing an aggregate distance of about eight miles. The instructions given on this occasion are exhibited in the Appendix, (See Document Z.) and are similar to those previously furnished in reference to definitive locations on other parts of the route.

During the absence of Col. Long, the location of the second division of the Rail-road, extending from Ellicott's mills to the forks of the Patapsco, had been so far accomplished that this portion of the route had been subdivided into twenty-six sections, under the direction of Mr. Knight. At this stage of the operations, Capt. McNeill proceeded to Washington, on business preparatory to the embarkation of the mission to England. In the mean time, many of the sections into which the second division had been subdivided, were farmed out for construction.

In reference to the subdividing and letting of this part of the road, the records of the Board of Engineers are entirely silent. No evidence is furnished of any authority having been given to the Superintendent for the adoption of these measures; nor does it appear that he ever applied to the Board for their instructions in reference thereto. The first notice on record, in which these measures are in the least implicated, is contained in a communication from the Superintendent, due on the first of the ensuing month, in which is contained the following remarks: "No payments have been made to contractors on the second division. The contractors are commencing and will, it is expected, be in full operation during the present month." This omission in the proceedings of the Board of Engineers, in reference to a measure involving the expenditure of more than a hundred thousand dollars, is not easily accounted for, especially when it is known that the President and Secretary of the Board, viz: Mr. Thomas and Mr. Knight were both present at the time.

October 20, 1828.—A meeting of the Board of Engineers was this day held, at which all the members, viz: Philip E. Thomas, President; Lieut. Col. S. H. Long, Mr. Knight, and Capt. McNeill, were present.

The proceedings had on this occasion are recorded at full length in the Appendix, (See Document Z.) and relate to the following subjects, viz: the location of the Rail-road as made under the direction of Capt. McNeill, from Ellicott's mills to the forks of Patapsco; instructions relative to a definitive location of the road, from Chapel ridge to the upper and lower Point of Rocks; the construction of wooden bridges as a means of crossing Gwynn's falls, Gadsby's run, the Patapsco river at Pierpont's rock, and the Frederick road at Ellicott's mills.

The following preamble and resolution, were also passed at this meeting, viz: "Whereas by a resolution of the Directors of the Baltimore and Ohio Rail-road Company, Jonathan Knight, and Capt. McNeill, two of the members of this Board, have been appointed to visit England, and are now about to depart on the service assigned them;" therefore

"*Resolved*, That in the absence of these members, all the powers of this Board be vested in, and shall be executed by Col. Stephen H. Long, and Philip E. Thomas, the two members remaining in this country."

Mr. Thomas now signified his determination to resign his appointment as President of the Board of Engineers, which was a step he had long since resolved on taking, whenever a favorable opportunity was presented. He regarded the present juncture as affording such an opportunity, and he now respectfully tendered his resignation, which was accepted; whereupon it was

"*Resolved unanimously*, That Col. S. H. Long be, and is hereby, appointed President of the Board of Engineers."

October 21, 1828. At a meeting held this day, all the members of the Board being present, a report (See App. Doc. A. 1.) drawn up by Mr. Knight, and signed by Col. Long, Mr. Knight, and Capt. McNeill, was submitted, read, and *unanimously* concurred in. This report was made in conformity to a requisition

of the Board of Engineers, under date of the 13th inst. calling for a decision upon the propriety of admitting a rise of nine feet above the established grade line, at the centre of the deep cut. Examinations and enquiries having been carefully made, and no sufficient reasons having been discovered to induce a deviation from the plan of graduation upon a dead level as originally adopted, the measure adverted to, contemplating a rise of nine feet was unanimously rejected, Mr. Thomas joining in the vote. At this time no doubts were entertained as to the stability of the side slopes, nor was any difficulty apprehended from the occurrence of quick-sands, or springs of water.*

The meeting of the 21st, was the last that took place, prior to the departure of the gentlemen composing the deputation, who set out upon their voyage on the day following.

No definite instructions had as yet been prepared, for the purpose of directing the attention of these gentlemen in their researches, or aiding them in their enquiries. Col. Long was accordingly requested by the President and Directors of the Company, to prepare a variety of interrogatories and instructions, setting forth some of the most prominent objects claiming attention, in season for transmission to New York, prior to the first of the ensuing month, at which date the packet, on board of which the mission were to embark, was expected to sail from that port.

October 24, 1828. Col. Long this day submitted in the form of queries, arranged under a variety of different heads, the instructions called for by the President of the Company, which were transmitted to the Board of Directors, and having been approved by them, were forwarded to New York. (See App. Doc. B. 1.)

It having been determined to construct a wooden viaduct across Gwynns' falls, and it being at this time deemed advisable to make preparations for laying the foundations of that work,

*This decision was communicated to the Directors, and would in all likelihood have been overruled by them, had they not concurred in the opinion expressed by the Board of Engineers.

prior to the commencement of cold weather, instructions were issued to the Superintendent, by order of the Board of Engineers, in which certain measures agreed on by the Board, were specified, and directed to be carried into effect. No notice was taken of the instructions given on this occasion, nor does it appear that the Superintendent made a single effort to comply with their requisitions; on the contrary, a counter project was immediately set on foot, in which he took a leading part, and which eventually contributed to defeat, not only the object of these instructions, but various other purposes of the Board of Engineers, and involved the Company in the expenditure of vast sums of money, which might have been avoided; as will hereafter be made to appear.

At the same meeting, October 24, additional instructions (See App. Doc. C. 1.) were furnished to Lieut. Gwynn, and the officers on duty with him, for their guidance in making the location, authorised in conformity to a resolution of the 13th inst. (See Documents Y. & Z.) and in executing the drawings illustrative thereof, as also, the estimates setting forth the amounts of excavations and embankments attendant upon the route, as located by them.

In accordance with the purpose heretofore intimated, of establishing regularity and system in the fiscal operations of the Company, a form for monthly estimates, on account of construction, having been carefully devised, (See App. Doc. D. 1.) was this day submitted and approved, and was to be observed as preliminary to all future appropriations of funds in that department of the service.

Oct. 29, 1828.—The attention of the Board of Engineers was now directed to the adoption of such other measures in reference to the fiscal concerns of the Company, as would more effectually ensure a rigid observance of the system of accountability, enjoined by the Directors in the regulations for the Engineer Department, and the utmost economy in the disbursement of the funds of the Company. In order partially to accomplish this object, the following circular relating to monthly estimates, was

addressed to the several officers in the Rail-road service, who had been entrusted with the funds of the Company.

OFFICE OF THE BOARD OF ENGINEERS,
Baltimore, Oct. 29, 1828.

"SIR:—The Board of Engineers considering it expedient, that the monthly estimates required from bisbursing officers, be furnished in duplicate (on or about the 1st of each month) in order that this office and that of the Treasurer of the Rail-road Company, may respectively be furnished with one; you are accordingly requested to prepare the estimates due from you on the first proximo, and forward them to this office, in Duplicate.

Blank Forms for estimates will be furnished from this office on your requisition for the same.

By order of the Board of Engineers,

(Signed,) S. H. LONG, *President.*"

The 6th and 7th Articles of the Regulations (See Doc. L.) obviously contemplate the establishment of Forms for Estimates, Abstracts, Vouchers, &c. &c. which it was the duty of the Board of Engineers to prescribe, and which had been urged upon the attention of this Board, by Col. Long, at the time of the adoption of the Regulations—and inasmuch as the occasions for disbursements had already been multiplied, to an extent that called for the utmost vigilance on the part of the officers and agents charged with the supervision and control of the fiscal transactions of the Company, it behoved the Board at this stage of their operations, to make provisions calculated to insure accuracy, and facility in the keeping, rendering, and adjustment of all accounts of which they were required to take cognizance.

Certain resolutions were passed at the same meeting, directing the construction of transverse road drains, in certain situations,—the preparation of broken stone to be kept in readiness for spreading upon the graded surface of the road, as a means of protecting it from washing and other abrasions,—the formation and protection of ditches and bermes in the deep cut, which were deemed indispensable to the drainage of the cut, and the security of its banks. A copy of these resolutions (See Appen-

dix, Doc. E. 1.) was ordered to be furnished to the Superintendent for the purpose of directing his attention to the measures therein contemplated.

It should be remarked, before we proceed farther, that Mr. Thomas was occasionally absent from the meetings of the Board of Engineers at the dates of their proceedings. He had previously apprised Colonel Long, that such would probably be the case frequently; and earnestly solicited the latter to institute proceedings whenever he thought them necessary, and to act on all such occasions precisely as if Mr. Thomas were present, inserting the name of Mr. Thomas as present at the meeting—Colonel Long did on several occasions proceed according to the wishes of Mr. Thomas as above intimated—but never suffered the proceedings had on such occasions to be recorded, nor did he take any other order in relation to them, till they had previously been examined and approved by Mr. Thomas—Col. L. does not recollect whether Mr. T. was present at the meeting above adverted to or not, but is certain that his unqualified sanction was given to the measures adopted under that date.

Nov. 3, 1828.—The President of the Board of Engineers this day submitted a communication to the Superintendent, enclosing a copy of the Resolutions passed on the 29th ult. and explaining the manner in which they were to be carried into effect, (See Appendix, Doc. F. 1.) which was approved and ordered to be forwarded. This communication appears never to have been noticed by the Superintendent, nor does it appear that any of its injunctions were ever complied with. On the contrary, it has been admitted (See Report of the Committee of Investigation, in a subsequent part of this narrative,) that Mr. Thomas did actually sustain him in direct disobedience of most, if not all, of the requisitions contained in these Resolutions.

A strong desire had been for some time manifested on the part of the Board of Directors to commence the work of construction at the Point of Rocks, and between that point and Chapel ridge, at as early a date as practicable. Col. Long was decidedly in favour of this measure, inasmuch, as it would afford an

opportunity of demonstrating to the public, the practicability of grading the road at an expense far less than that which was known to be unavoidable on the first division. Accordingly the location and other measures preparatory to the commencement of the work, on this part of the route, had been prosecuted with the utmost diligence, and the Board of Engineers were now prepared to authorize its commencement, in reference to which they passed the following resolutions, viz:—"Resolved that the work of excavation at the Lower Point of Rocks so called, situated on the margin of the Potomac river, be commenced with all practicable despatch, and with a force not exceeding twenty-four men, whose compensation inclusive of their board, &c. shall not exceed seventy-five cents per day for each day's work."

"Resolved that the necessary tools, ammunition, &c. required for the performance of the work, be procured at the expense of the company, *and that a particular account embracing all expenditures incurred in this service, and incident thereto, be kept and rendered monthly, in conformity to the regulations instituted for the government of the Engineer Department of the Baltimore and Ohio Rail-road Company.*"

A copy of these resolutions was ordered to be submitted to the Board of Directors, in order to obtain their sanction to the measures proposed, prior to their ultimate adoption.

Nov. 4, 1828. The President of the Company this day verbally communicated to this Board, the decision of the Board of Directors in reference to the resolutions of the 3d inst., which had been submitted to that body for their approbation; which was as follows, viz: "that the Board of Engineers were authorised to take any steps they might deem proper for the commencement and prosecution of the work of construction at the Lower Point of Rocks."

Prior to this date, the question as to the preference that ought to be awarded to wooden or stone structures, as a means of crossing Gwynn's falls, the Patapsco, &c. had been considerably agitated, and doubts were entertained with respect to the decision that would be given by the Board of Directors, till a verbal commu-

nication which was this day made by the President of the Company, seemed to put the question at rest. The decision thus obtained in reference to the mode of constructing viaducts across Gwynn's falls and the Patapsco, was "that the Board of Directors were not disposed to authorise any departure from the plan of construction previously recommended by the Board of Engineers," i. e. the construction of wooden instead of stone bridges.

Nov. 5, 1828. Proposals having been received for the delivery of Magothy pine, the President of this Board was directed to furnish a clear description of the timber required for rails, setting forth its dimensions, quality, &c. and to apprise the person who made the proposal, that the Board would receive of him any amount not exceeding two hundred thousand feet, (superficial) at the rate of $20 per thousand, provided it answered the description prescribed. The communication made in relation to these subjects is exhibited in the appendix. (See Doc. G. 1.)

Nov. 11, 1828. Instructions were prepared and transmitted to Lieut. Gwynn, apprising him and the officers on duty with him, of the service required of them when they shall have completed the location in which they were now engaged. (See Ap. Doc. H. 1.) The object of these instructions was to effect a connexion between the several surveys heretofore made on the westerly declivity of Parr spring ridge, and those still in progress in the valley of the Patapsco, prior to closing the field operations of this season. By this means the Board of Engineers would be enabled to exhibit a connected view of all the surveys made, extending from Baltimore to Williamsport.

A monthly estimate was submitted by the Superintendent, agreeably to the form prescribed, except in so far as related to the force employed during the preceding month, of which no account was given. The estimate however, was not accompanied by a monthly report as required by the 5th article of the regulations (See Doc. L.) nor by a minute detail of proceedings as required by his instructions of July 22. (See Doc. O.) The only details of the character alluded to, were those contained in the estimate, which were as follows, viz: "sections No. 6, 14 and

16 may be regarded as completed. About one thousand perches of masonry have been built. In this branch of the service much difficulty has been experienced for the want of good masons.—No payments have been made to contractors on the second division. The contractors are commencing and will, it is expected, be in full operation during the present month. No doubt is entertained of the completion of the second division as early as that of the first division." Such is the nature, character, and substance of the details which the Board of Engineers, as also that of the Directors must now accept, as the only exhibit of the various objects on which $30,000 had actually been expended. No other report setting forth the objects of expenditures, had ever been received from the Superintendent !!

Notwithstanding there had been a manifest disposition on the part of the Superintendent to evade the requisitions of the Board of Engineers on this as well as on former occasions, it was deemed imprudent to withhold an approval of the estimate at this time, inasmuch as the exigencies of the service required an immediate appropriation of funds; while on the other hand, there appeared not only an aversion to comply on the part of that officer, but a reluctance to exact a compliance on the part of others. Thirty thousand dollars were accordingly placed to his credit, without the least guarantee that it should be expended on the objects contemplated in the estimate, or even that it should be accounted for in a manner to show the extent and magnitude of the objects on which it should be expended.

The amount now set to the credit of the Superintendent in this loose way, was $60,000, with no other securiety for its faithful application, but the untried integrity of that individual, and with no other assurance of its being expended upon the duly authorised and legitimate objects of the Rail-road, but the accidental dictates of his arbitrary disposition, and capricious will.

At the same meeting the Board having been apprised that the revision of the location from Ellicott's Mills to the forks of the Patapsco, which had been commenced prior to Capt. McNeill's departure by his brigade, had been completed; a resolution was

passed urging the speedy accomplishment of the drawings illustrative of the surveys made in relation thereto, and directing the President of this Board to issue the necessary instructions, not only for the accomplishment of this object, but for the further prosecution of surveys in the valley of the Patapsco, from the forks of that stream to the mouth of Gillies' falls. The instructions issued on this occasion are exhibited in the Appendix, (See Document I. 1.)

November 17, 1828.—Notwithstanding the decision communicated to the Board of Engineers by the President of the Company, on the fourth instant, in reference to the manner of conducting the Rail-road across Gwynn's falls, the Patapsco, &c. the comparative merits of wooden and stone bridges, had undergone much discussion since that date, in which the Superintendent took a conspicuous part, and was seconded by several influential members of the Board of Directors. He was decidedly in favor of stone bridges, and apparently entertained an unconquerable aversion to wooden ones, and succeeded in winning many converts to his opinions. He made such representations in regard to the comparative merits of these two modes of construction, as induced a decided preference for stone bridges, and a general repugnance for those constructed of wood. Whatever be alleged as the cost in detail, or as the maximum cost of constructing a stone bridge, at this or the other place, was regarded as a matter of fact, and calculations based thereon were attempted to be made in order to exhibit the superior advantages that would result from the adoption of structures of this kind. Col. Long was solicited to aid in these calculations, and freely gave his assistance, premising that he should assume no data of his own accord, but draw his results exclusively from the data furnished by others. Questions of a similar nature had been deliberately acted upon by the Board of Engineers, and they had formed decisions entirely satisfactory to themselves, in which a decided preference had been given to wooden structures in several instances, and these decisions had been communicated

in due form to the Board of Directors, (See First Annual Report of the Board of Engineers, p. 14.) Moreover it appeared obvious, from the calculations now made, that in point of economy, wooden structures were entitled to the preference. Nor did any of the objections now raised against wooden bridges, militate in the least against the conclusions drawn in the report just referred to. The principal argument upon which the question appeared to turn was, that wooden structures were exposed to destruction by fire, and could not be effectually guarded from the clandestine attacks of incendiaries; and that in case of an accident of the kind, the damage resulting from the interruption of the traffic upon the road would be incalculably great.

It was urged on the other hand, that, judging from the number of bridges destroyed by fire in the United States, compared with those that had escaped, a premium of one per cent. would cover all damages to be apprehended from this cause, and that in case wooden bridges were to be excluded on all parts of the road, double the contemplated amount of capital would be required for its construction.

The arguments in favor of stone bridges finally prevailed to the entire exclusion of wooden bridges from the first division of the road, as will be seen by the following "extract from the proceedings of the Board of Directors, at a special meeting held on the fourteenth instant," and this day (November 17th,) submitted to the Board of Engineers:

"OFFICE OF BALTIMORE and OHIO RAIL-ROAD COMPANY,
November 14, 1828.

"At a special meeting of the Directors held this day, the consideration of the Board having been called to its decision of the 3d instant, relative to the construction of a wooden or stone viaduct across the Patapsco; and the Board having further consulted the Board of Engineers and the *Superintendent of Construction!* and it appearing *from the representation of the latter*, that it is now ascertained that an abundant supply of stone, of the most excellent quality, can be obtained immediately on the spot

where the road will cross the Patapsco, and that the expense of a stone structure *will be greatly reduced*, it was on motion,

"Resolved, that the Board of Engineers be requested to explore, or cause to be explored, the country within a reasonable distance of the point where it is contemplated to build a viaduct over Gwynn's falls, for the purpose of ascertaining whether stone of suitable qualities can be conveniently found to erect a stone structure over that stream, and that they report thereon to this Board as early as possible, and also an estimate of the probable expense."

"The President of the Board of Engineers, at the request of this Board, made an exhibit of the difference of the estimated cost of a wooden viaduct, and of a permanent embankment of earth across Gadsby's run; which being deliberately considered, it was, on motion,

"Resolved, that the Board of Engineers be directed to conduct the road across that valley by an embankment of earth."

In reference to the last of these resolutions, a few explanatory observations seem neeessary, in order to show the reasons and nature of the exhibit therein adverted to.

A short time prior to the passage of these resolutions, probably on the preceding evening, Messrs. A. B. and Son, who have uniformly manifested an enthusiastic zeal for the advancement of the interests of the Rail-road, waited on the President of the Board of Engineers, and explained their views and wishes in regard to the substitution of an embankment, for the wooden viaduct contemplated to be erected at the passage of Gadsby's run. They were satisfied, that although the embankment might prove somewhat more expensive in the outset, yet it would be far more economical in the end. They had made their calculations, and were convinced that, by using temporary Rail-ways and cars, for the transportation of the earth, the actual cost of the embankment need not exceed ten cents per cubic yard; yet to make all due allowances for the unskilful management of that sort of apparatus, it would be well to estimate the cost at four,

teen cents per cubic yard. On a farther discussion, in order to cover all mistakes, they agreed that the cost of the embankment might more safely be estimated at sixteen cents per cubic yard, and requested the President of the Board of Engineers to prepare an estimate, based upon that price, for the information of the Board of Directors.

An estimate was accordingly prepared, exhibiting results of the following import, viz:

171,839 cubic yds. of embankment, at 16 cts.		$27,494,24
Estimated cost of stone bridge,	-	15,000,00
Aggregate prime cost,	-	42,494,24
Estimated cost of a wooden viaduct,		15,000,00
Difference of prime cost in favor of wooden viaduct		27,494,24
On the supposition that the wooden structure would last eight years, the interest on this difference, at six per cent. during that period, must be added to the difference of the prime cost, making the aggregate amount, in favor of the wooden structure at the expiration of that time, equivalent to		$43,820,32

This last amount would be sufficient to defray the expense of an embankment at the expiration of the eight years, estimated as above, at $27,494,24; together with that of a stone bridge, estimated as above, at $15,000, and leave a net balance of $1,326,08 in favor of the wooden structure; no allowance being made for the greater facilities of transporting the materials for construction afforded by the Rail-way and wooden viaduct, which are of course admitted to have been constructed, in this case, prior to the embankment and stone bridge.

We will take this occasion to remark, that the prime cost of the embankment and stone bridge, instead of being $42,494,24 as above stated, will have actually amounted to more than double that sum; whereas it has been clearly ascertained that a wooden viaduct might have been constructed for the sum annexed to this item, viz: $15,000.

The order taken by the Board of Engineers in pursuance of these resolutions, provided in the first place for a repeal of their former decision in reference to wooden viaducts; and in the second, for the issuing of certain instructions to the Superintendent, (See Appendix Document K. 1.) directing the construction of a stone viaduct across the Patapsco, with two arches of fifty-five feet span each. The width of the road-way was to be twenty-four feet between the parapet walls. This dimension was subsequently altered at the instance of Mr. Wever, or Mr. Thomas, to twenty-six feet. The form and structure of the viaduct were required to be such as to render it plain and substantial in the highest degree, and such as the Board of Engineers might approve. The position of the viaduct was distinctly specified; and the Superintendent was informed that a competent Engineer would be detailed to designate it upon the ground. The Superintendent was moreover notified that an embankment was to be formed in the valley of Gadsby's run, and that a change in the location on the tenth and eleventh sections would be required in conformity thereto, which change would be made by a competent Engineer detailed for that purpose.

Instructions were also issued to Lieut. Barney in reference to the same subject, (See Appendix Document L. 1.) requiring him to make the changes in the location above adverted to, and designating the manner in which these changes should be made.

The changes were forthwith made by Lieut. Barney, agreeably to the instructions he had received, and the Superintendent was duly apprised thereof. Yet this individual, utterly regardless of the instructions he had received, directed Lieut. Cook, then acting as his assistant, to make a location for the Patapsco bridge totally different from that so particularly designated in the instructions given, both to himself and to Lieut. Barney, and thus in direct violation of the instructions of the Board, assumed a position for the viaduct, at least fifteen feet farther downward on the stream than that required, and in a situation in which the construction of the bridge, in the opinion of the builder, would

enhanced at least a thousand dollars.

About the time of receiving the instructions above mentioned, the Superintendent took occasion to remark, in the presence of Lieuts. Barney and Dillahunty, assistant Engineers, that he had received a great many instructions from the President of the Board of Engineers, *but really he had not time to read them;* all he wanted from the Board of Engineers, was simply to show where they wanted the road to be made, and he would make it for them, &c.

We shall here take occasion to offer a few remarks, on the subject of plans for bridges. That it was the appropriate duty of the Board of Engineers to plan all the bridges and culverts required in the construction of the road, there cannot be the least doubt. A majority of the Board however, as heretofore intimated, were in favour of entrusting to the Superintendent, the planning of all bridges, &c. of a span not exceeding twenty feet. (See Appx. Doc. O.) The Superintendent moreover regarded it as peculiarly within his province, to devise and adopt plans for all stone bridges, independently of any consultation with the Board of Engineers, any farther than he might think proper to ask their counsel. He had hitherto been so far sustained in these views, that although many bridges had been planned by him, and several already constructed agreeably to his directions, the Board of Engineers had never been called upon for their opinion, as to the manner of their construction, or their dimensions, nor had any plans ever been submitted for their approval, and adoption.

The President of the Board of Engineers, still deeming it incumbent on this Board to furnish plans of Bridges, which the Superintendent should be required to carry into effect, and especially of such bridges as exceeded the dimensions specified in the general instructions given to that officer, at the time of commencing his duties, (See Doc. O.) was now engaged in planning the bridge authorised to be built across the Patapsco, by the resolution above recorded. He had made considerable progress in the execution of this purpose, when he apprised Mr. Thomas of his design. Mr. T. replied that the Superintendent thought himself entitled to the privilege of planning *his own bridges*, and Mr. T.

was averse to giving him *any uneasiness* about this matter. He concluded by stating that the President of the Board of Engineers *might furnish* such plans as he thought proper, and that the Superintendent would be allowed the same privilege; that both plans thus produced should be examined, and the plan which was thought entitled to the preference should be adopted. The President of the Board of Engineers declined having any thing to do in a competition of this sort, and refused to furnish a plan, unless by an order from the Board of Engineers, which Mr. T. was not disposed to advocate; alleging that the duties now demanding the attention of the President of this Board, such as the location within the city, the surveys and delineations relative to the location at the Point of Rocks, and those in relation to the location from Baltimore, to the forks of Patapsco, the construction of a tunnel at the Washington road, &c. &c. were sufficient to occupy his attention; thus evincing his desire that the planning of bridges, whatever might be their dimensions, should be left to the Superintendent.

Nov. 19, 1828. The measures designed to be taken in reference to the commencement of the work of construction, at the Point of Rocks, as intimated under date of the 3d inst., were now to take effect. The Board of Engineers were this day notified, that the location of the Rail-road from the Upper Point of Rocks to Chapel ridge, would be completed during the present month. Public notice was accordingly given, inviting proposals for the construction of that part of the Road.

Prior to this date, arrangements had been made for the commencement of operations at the Point of Rocks, and had been so far completed as to enable the Board to act decisively on this subject, at their next meeting, which took place on the 25th instant, when the following proceedings were had.

Nov. 25, 1828. A personal interview having been held with Mr. Thomas Shriver, of Fredericktown, at which the subject of his being employed as agent for the Board of Engineers, in carrying on the work of construction at the lower Point of Rocks, was taken into consideration, arrangements were made for commenc-

ing operations at that place without loss of time under the Superintendence of Mr. Shriver.

Various instructions, which are exhibited in the appendix (See Doc. M. 1.) were issued in reference to these operations, and active measures were immediately taken for carrying them into effect.

The decisions of the Board of Engineers, with respect to wooden viaducts across Gadsby's run and the Patapsco, having been overruled by the Board of Directors in the manner before stated, Col. Long who had never been particularly anxious for a tunnel on the second section, first division, at the crossing of the Washington road, now submitted a variety of estimates exhibiting the probable cost of tunnels of different lengths, of a stone bridge and of a wooden bridge, proposed as a substitute for the contemplated tunnel. He was induced to take this step from a conviction that a tunnel would prove far more expensive than a wooden bridge, which would subserve the purpose equally as well. Being aware that the changes already authorised by the Board of Directors would occasion an increased expenditure, he was desirous of affording them a fair opportunity of adopting a change that would contribute to a reduction in the expenses of the Railroad. Agreeably to the estimates prepared on this occasion, which related to no less than eight modes of construction, the advantage resulting in favour of a wooden structure, compared with the least expensive of any other of the modes proposed, was equivalent to about a thousand dollars, no allowance being made for unforeseen difficulties which must from the nature of the case, prove more serious impediments to the construction of a tunnel or stone bridge than to that of a wooden bridge.

Mr. Thomas was opposed to laying these estimates before the Board of Directors, inasmuch as the construction of a tunnel had been recommended and adopted by the Board of Engineers, and received the sanction of the Board of Directors, and inasmuch as all parties concerned appeared desirous of witnessing the successful accomplishment of a structure so novel and unprecedented in the public works of this country.

Nov. 27, 1828. These estimates being duly considered by the Board of Engineers, with a particular reference to the resolution passed by this Board on the 13th October, (See Appx. Doc. Y.) that designated as No. 4, which exhibited the probable cost of a tunnel one hundred feet in length, was adopted, and the President of this Board was directed to make the necessary arrangements for its location and construction.

CHAPTER IV.

Operations at the Point of Rocks arrested by an injunction.—Surveys from first stone to tide water.—A stone viaduct at Gwynn's Falls required.—Instructions in relation thereto.—Measures affecting operations at deep cut.—Committee appointed to report on the affairs of deep cut.—Disagreements in the Board of Engineers.—Their nature and origin.—Effort of Mr. Thomas to check them, by transferring all responsibility from the Board to the Superintendent.—Col. Long's opposition to this measure.—Mr. Thomas appointed as commissioner to supervise the operations of the Superintendent.—Monthly estimate of Superintendent.—Account of Field Surveys and Locations.—Superintendent frequently absent without previous notice to the Board.—Remonstrances of Col. Long.—Winan's car, an invention of great concernment.—Its merits considered.—Quarterly accounts submitted to the Board.—Various stone bridges ordered.—The quarterly accounts of the Superintendent.—The means of establishing their validity adopted and subsequently disregarded.

In conformity to the measures adopted, in reference to the commencement of the work of construction, at the Point of Rocks, &c. as intimated in the preceding Chapter, the work was about to be commenced, when an injunction was laid at the instance of the Chesapeake and Ohio canal Company, prohibiting any further operations in relation to the construction of the Railroad within the limits of Frederick, Washington and Alleghany Counties.

December 4, 1828.—In accordance with a resolution of this date, the President of the Board of Engineers was directed to apprise the officers and others employed in the Rail-road service, that all operations connected with the location and construction of the road, between the Point of Rocks, and Chapel ridge were to be suspended until the question as to the *right of way*, which had for some time been pending between the Canal and Rail-road Companies, should be finally settled. He was also directed to "withdraw the party acting under Lieutenant Gwynn, and instruct them to resume their operations at Parr spring ridge in conformity to the instructions heretofore given," under date of Nov. 11, (See Doc. H. 1.)

A communication was this day received from the President of the Company, enclosing the following extract from the proceedings of the Board of Directors, under date of Dec. 1st, 1828.

1st.—"Resolved that the Board of Engineers, be directed to run the neceesary preliminary surveys, so as to lay before this Board a plan for the prolongation of the Road from the First Stone, on the southwest line of the City, to tide-water within the City of Baltimore, *keeping in view the resolution*, of the Board passed on the 28th of May, 1828, *that this location be so made as to admit of the distribution of the trade of the road* THROUGHOUT ALL PARTS OF THE CITY AS NOW IMPROVED."

2d.—"The President submitted a letter from the *Superintendent* estimating the cost of a stone bridge over Gwynn's Falls, at from *twelve to sixteen thousand dollars:* whereupon it was resolved that the Board of Engineers be directed to cause a stone bridge to be constructed across that stream upon the first section of the road."

The order taken by the Board of Engineers in reference to these resolutions is exhibited in the appendix (See Doc. N. 1.)

With regard to the first resolution, the duties specified therein were assigned to the direction of Col. Long, who took measures preparatory to the accomplishment of the contemplated surveys as soon as the requisite number of assistants could be withdrawn

from other branches of the service and assigned to the duties enjoined by the resolution.

With regard to the second resolution it is a matter of no small surprise—that the Superintendent should of his own accord have submitted, or been called upon by the Board of Directors, or any one of its members, for an estimate of the cost of the bridge in question; since, agreeably to the 2d Article of the Regulations (See Doc. L.) *the superintendence and control of the formation of plans and estimates*, was vested in the Board of Engineers, and agreeably to the 4th Article of the same instrument, "*the Superintendent should receive all his instructions from the Board of Engineers.*"

This procedure is the more remarkable, inasmuch as the Board of Engineers were never apprised of the measure, or even the intention of calling upon the Superintendent or any one else for the estimate alluded to, till after it had been submitted to the Board of Directors, and made the basis of the resolution in question.

Whether the promoters of the measure designed to second the views and purposes of the Superintendent as expressed in his forms for contracts, (See Doc. Q. & R.) or whether Mr. Wever gratuitously obtruded his opinions in this case, is with us, entirely problematical. It is nevertheless quite certain, that it had the effect of forestalling the opinions of the Directors and of superseding the decision of the Board of Engineers, which was known to have been given in favor of a wooden bridge. It is no less remarkable that the Board of Directors, should have been thus accessary to a violation of their own regulations, and at the same time suffer their judgments to be hoodwinked by a representation so feeble, inadequate, and defective, as that made by the Superintendent which in fact exhibited no details in relation to the quantity or quality of the masonry required—the ease or difficulty with which the materials could be procured, the dimensions of the contemplated structure, or the period required for its completion. In truth the only ground upon which the resolution was based, was a mere random opinion of the Super-

intendent that stone of a suitable quality for the construction of the bridge, could be procured in the neighborhood of its contemplated site, and that the cost of the bridge might amount to between twelve and sixteen thousand dollars, as stated in the resolution.*

Agreeably to an order of the Board of Engineers, and in conformity to the resolution just alluded to, instructions were prepared and forwarded to the Superintendent (See Appx. Doc. O. 1.) in which it was expressly enjoined, that "the dimensions, form and mode of construction will be such as to ensure freedom of passage for the water of the stream, together with simplicity, neatness, and permanency of structure; and *will be such as this Board may approve.*"

"The Superintendent was also directed to report to this Board his views in reference to the particulars above mentioned, and to submit for their inspection and approbation, any measures or plans he might think proper to adopt for the accomplishment, not only of the work under consideration, but of any others of a similar character, connected with the Rail-road," and entrusted to his superintendence.

As yet no plans or estimates relative to the construction of bridges, had ever been furnished by the Superintendent, to the Board of Engineers, although works of the kind, involving the expenditure of many thousand dollars, were already in progress. He had spurned at the idea of having plans furnished him by the Board of Engineers, while a majority of this body had so far suffered their duties and powers to be tampered with, and set at defiance, that any exercise of the privilege of devising and pre-

*It is worthy of remark, in this place, that a bridge of twenty feet span, subsequently built over an inconsiderable stream called Gwynn's run, within about two hundred yards of the site of the Gwynn's Falls bridge, has cost agreeably to statements made at the instance of the Superintendent, considerably more than the largest amount required for the construction of the bridge last mentioned agreeably to the above estimate. This circumstance is the more remarkable, inasmuch as the Superintendent never contemplated the construction of a bridge across Gwynn's Falls of a span less than forty feet—and of course containing more than double the quantity of masonry, contained in the Gwynn's run bridge.

scribing plans of bridges, began to be regarded as an infringement upon the rightful prerogatives of this arrogant pretender. So zealously were his claims in this respect supported by the President of the Company, that no decision calculated to invalidate, or in any way affect them, could be passed by the Board of Engineers, which now consisted only of Mr. Thomas, President of the Company, and Col. Long, President of the Board of Engineers, in whom had been vested all the powers of this Board during the absence of Mr. Knight and Capt. McNeill.

The manner in which the work of excavation at the deep cut (fourth and fifth sections of the first division) was now conducted, and the impediments that had already presented themselves, in the way of a speedy and economical accomplishment of that heavy job, began to rouse the apprehensions of those who had undertaken it, lest they should fail to realize an adequate remuneration for their services. The season had become very unfavourable for their operations, they had been required to keep a larger force employed than the shortness of the days and the inclemency of the weather would justify; they had experienced unforseen difficulties, occasioned by an unexpected hardness and tenacity in the earth, which greatly retarded their progress, and they must now be allowed a higher price for excavation than that originally stipulated, or be compelled to abandon their work.

The President of the Board of Engineers was decidedly in favour of the measure last adverted to, believing that inasmuch as a higher price must in all probability be paid to an indefinite extent, it would be better to satisfy the honest demands of all heretofore concerned, and make an entire new arrangement for the future prosecution of the work. The Board of Engineers at first concurred in these views, and instructions for carrying them partially into effect, which had been previously prepared and transmitted to the Superintendent, were this day approved and ordered to be recorded. (See Appx. Doc. P. 1.)

Agreeably to these instructions, the Superintendent was to make payments for all the work done at a rate not exceeding eighteen cents per cubic yard. This was the price at which it

was stipulated to be done, together with an additional allowance at the discretion of the Board of Engineers and Superintendent, in case the earth should prove more difficult of excavation than had been anticipated, or rather, too difficult to be removeable by means of the plough and spade. According to a statement which accompanied the instructions, it appears that the amount of earth excavated up to the 22d of November, was 62,000 cubic yards; the cost of which at 18 cents per yard,

was : : : : : : : :	$11,160 00
And that the actual cost of the work, exclusive of any compensation to contractors, was : :	13,590 65
Leaving as a deficit to be accounted for, on a final settlement with the contractor, this sum :	2,690 00

together with an equitable allowance for the amount of work done subsequently to the 22d November, and a reasonable compensation for the personal services of the contractor; both of which to be awarded at the discretion of the Board of Engineers, and sanction of the Board of Directors.

With respect to this part of the work (the deep cut) there had existed considerable difference of opinion between the President of the Board of Engineers, and the Superintendent, the former having entertained the belief, that the excavation might be made more economically and expeditiously by the use of strong ploughs and heavy teams of oxen, while the latter preferred the pick and spade, and in the harder parts powder blasts, as the more economical and efficient means of carrying on the work. The other member of the Board, Mr. Thomas, coincided in the opinion of the Superintendent, and the mode of operation preferred by the latter was of course pursued.

Dec. 6, 1828. The measure adopted by the Board, under date of the 4th inst., proved unsatisfactory to some of the parties concerned, and a substitute (See Appx. Doc. Q. 1.) was this day proposed by Mr. Thomas as more conducive to the satisfaction of all parties and to the interests of the Rail-road Company. Mr. T. was of opinion that the measure adverted to, would tend to interrupt the progress of the work, which must not be intermit-

ted on any account. Mr. Wever was also of opinion that the work must stop, unless a different course were pursued. Col. Long would rather the work should be delayed awhile, than risk the evil consequences of an unsettled plan of operations. Yet he would not object to any arrangement, the adoption of which might contribute to the speedy adjustment of the affairs of the deep cut, and result in the economical prosecution of the work at that place. Accordingly, on motion of Mr. Thomas, the instructions to the Superintendent, which were approved by the Board on the 4th inst. were cancelled, and the adjustment of the difficulties in question was referred to Mr. Thomas as a committee on the part of this Board, and to Mr. Wever, who were to co-operate in bringing about a satisfactory issue, and to report thereon *at an early date*, it being understood, that any measures they might think proper to take would not be obligatory upon this Board, until sanctioned by it.

It is proper to remark in this place, that the report thus called for "*at an early date*," agreeably to the requisition above stated, was not furnished till June 26, 1829, more than a month after the return of the mission from England, the Board having been kept in ignorance of the measures taken by the gentlemen above named, till that time.

A report from Lieut. Gwynn, exhibiting the results of laborious calculations, for determining the amounts of excavations and embankments on the route located by himself and the officers on duty with him, was this day received, and ordered to be recorded. The amount of excavation on the route from Chapel ridge to the Point of Rocks was 132,304 cubic yards, and that of embankment between the same points, 121,436 cubic yards, making the total amount estimable on account of grading 253,744 cubic yards, exclusive of sidelong ground, whereon the cutting and filling are about equal to each other.

Plans and profiles illustrative of the location, which had been prepared in the field, were also submitted at the same time.

December 9, 1828.—It is manifest from a view of what has been stated in reference to the opinions of the different members

of the Board of Engineers, as expressed on sundry occasions, and especially in reference to those of Mr. Thomas and Col. Long, that disagreements did frequently occur between them, and that the harmonious co-operation of these two individuals was frequently interrupted by these collisions in their opinions. It is no less certain that Col. Long never did obtrude his sentiments, on any contested question, any farther than he was bound in common honesty to do as a professional Engineer, and by recurring to the various subjects, in reference to which there has been any clashing of opinions, it will appear that they were all of a professional aspect and bearing. Moreover it is an obvious and fair presumption, that the education and protracted experience of Col. Long rendered him more competent as a judge of these subjects, than Mr. Thomas who was ever more ready to admit his incompetency as an Engineer, than to relinquish his favorite plans of engineering. In reference to any disagreements that ever took place between Mr. Thomas and Col. Long, which were habitually made by the former a *subject of extreme regret* in conversations that took place between him and many of his friends, and especially members of the Board of Directors; the latter positively disclaims ever having transcended his appropriate sphere, in giving his opinions and advocating measures relative to the concerns of the company.

The disagreements above adverted to, can be traced back no farther than the date of Mr. Wever's introduction into the service of the company. The influence of this individual subsequently, gave a new turn to the affairs of the company both in the cabinet and in the field.

Mr. Thomas was aware that the introduction of Mr. Wever had given rise to all the misunderstandings hitherto existing in the Board of Engineers, but appeared unwilling to attach any blame to this individual on that account, nor could he consistently with the course he had pursued, and the support and encouragement he had given to Mr. Wever, admit that the latter had acted an injudicious, improper, or reprehensible part, without criminating himself. He was accordingly disposed to ascribe

all the misunderstandings in question, to controversies of a personal nature between the President of the Board of Engineers and the Superintendent, and seemed to regard the course taken by the former as vindictive, rather than conducive to the interests of the company. Availing himself of the opportunity growing out of this state of things, Mr. Thomas made an effort, apparently with the double design of inflicting a penalty upon Col. Long, by excluding him from a participation in the personal supervision and management of the operations in which Mr. Wever was engaged, and of enlarging the powers and privileges of the latter, to an extent far beyond the limits prescribed in the regulations, as a reward for his correct opinions and efficient services. In fact, it seemed an object with Mr. Thomas to vest in Mr. Wever the exclusive management and control of all operations connected with the formation of the road, and to render him exclusively responsible for the faithful execution of the work, as evinced by the following extract of a letter of this date, which is given at full length in the Appendix, (See Document R. 1.) in which Mr. Thomas suggests "that the Superintendent be furnished with the necessary instructions as to the location of the road, its courses, widths, grades, structure, and all other information *he may desire*, so as to enable him clearly to understand the views and conclusions of the Board in relation thereto, *that it then be considered his duty to take* EXCLUSIVE CHARGE *of the subject, with full liberty to call to his aid such assistants as he may deem necessary*, which assistants, and all contractors and subordinates employed under them, *being directly responsible to the Superintendent*, HE, *of course will be responsible for the faithful and correct discharge of their several and respective duties and obligations!!*

In allusion to this proposition from the President of the Company, it is only necessary to advert to the unexampled, inefficient and ridiculous attitude in which the Engineers would be placed, by excluding them from the inspection and management of the work during its progress, and from any direction or supervision of the manner in which their plans and instructions might be car-

ried into effect, and even from the possibility of knowing whether the work may have been executed in conformity to their views and designs.

The affairs in relation to the construction of the road, had now actually come to such a pass in consequence of a habitual opposition to the measures advocated by the President of the Board of Engineers, and a uniform predilection for those recommended by the Superintendent, that the influence of the former had become too much impaired to be of any avail in directing the operations of the latter, and he was at length more easily prevailed upon to shift from his own shoulders a responsibility calling for greater powers than he was permitted to exercise, and to allow it to be sustained upon the shoulders of another, who had connived at, and been instrumental in, the wresting of those powers from him.

On the receipt of the letter above cited, Col. Long had an interview with Mr. Thomas, in which the former warmly remonstrated against the measures proposed, and advised Mr. Thomas to desist from the purpose he had in view; alleging, that the adoption of such a course would not only be prejudicial to the interests of the company, but highly derogatory to the reputation of the Board of Engineers, as well as entirely subversive of their authority, privileges and duty, with respect to the most important concerns confided to their management.

In reply, Mr. Thomas adverted particularly to the "difference of opinion which had existed between the President of the Board of Engineers and the Superintendent," apparently implicating the former, and exculpating the latter. He continued his observations in language of the following import: "He dreaded the evil consequences to which the disagreement above adverted to, might lead, unless seasonably checked by some conciliating arrangement. To lose the services of the Superintendent at the present stage of the work, would involve the company in serious embarrassments. The posture in which the officers of the company now stood, was extremely delicate, and required the utmost circumspection on the part of all who were friendly to

the enterprise they had embarked in, in order to avoid a derangement which might prove fatal to their purpose. The legal question concerning the right of way, was still in agitation. The manner of introducing the road into the city of Baltimore was likely to excite much controversy. The cost of grading the first and second divisions of the Rail-road was likely to produce much dissatisfaction. The relief about to be solicited from the general government claimed the united and friendly efforts of all concerned. These and various other considerations called for the exercise of the most liberal forbearance and the most meek and zealous perseverance, in relation to all the operations now in progress Any steps tending to an open rupture or collision between the officers and agents of the company ought, in the present state of things, to be most sedulously avoided."

He concluded his remarks, by earnestly soliciting Col. Long to deliberate upon the proposition contained in his letter, and to give an answer in writing; at the same time expressing an earnest desire that some measures might be adopted for obviating the necessity of frequent interviews between Col. Long and Mr. Wever, which he was persuaded would only result in widening the breach between them.

On the day following December 10th, 1828, Col. Long prepared and submitted, in person, his answer to Mr. Thomas' letter, (See Appendix Document S. 1.) in which the several considerations suggested by Mr. Thomas, as above, were adverted to, and the following reply to the proposition contained in Mr. Thomas' letter, was furnished. "I do consent that the Superintendent be subject to your immediate direction and control, while employed in the performance of the duties already assigned him on the first and second divisions of the Rail-road, and such other duties as may be assigned him by the Board of Engineers in relation to those divisions, and that he be at liberty, with your consent and approbation as a member of this Board, to call to his aid such assistants as he may deem necessary to the performance of his duties as Superintendent; which assistants and all contractors and subordinates employed under them, shall

be directly responsible to the Superintendent: *Provided, that nothing herein stated shall be construed as having a tendency to restrict the Board of Engineers from a full exercise of the functions vested in them by the regulations of the Engineer Department; and provided that you hold yourself responsible as a member of this Board for a faithful and skilful performance on the part of the Superintendent.**

Mr. Thomas was willing to assume the responsibility above adverted to, although it was apparent that he would much more willingly have received Col. Long's written sanction to its exclusive investment in the Superintendent.

Having perused the letter, and discovering that its contents were not in accordance with his views, Mr. Thomas returned it to Col. L. with an express understanding "that all communications between the Board of Engineers and Mr. Wever, shall be made through Mr. Thomas, as a member or committee of this Board, and that the rules and regulations of the Engineer Department and of this Board remain in full force in all respects, S. H. Long being liable to be called on to aid Mr. T. with his counsel and advice at all times."

At the same time it was mutually agreed between Mr. Thomas and Col. Long, that while the former should devote his personal attention to the operations of the Superintendent, the latter should

* It may be supposed by many that Col. Long should not have yielded this authority to Mr. Thomas, the President of the Board of Directors. But the reader will bear in mind, that Mr. Thomas was not only President of the Board of Directors, but also a member of the Board of Engineers; then consisting of but two members, Mr. Thomas and Col. Long: the others being absent on the mission to England; that Mr. Thomas was the organ of communication between the two Boards, and must be supposed as possessed of, and sustained by, the views of the Directors; and that the arrangement was to endure only during the absence of the other members of the Board of Engineers; that Mr. Thomas preferred this course to that of reducing the Superintendent to proper order, and that Col. Long, confiding in the sincerity of Mr. Thomas, saw the necessity of yielding temporarily, or of hazarding the production of all the evils which Mr. Thomas, the President of the Board of Directors, responsible for its operations, and a member of the Board of Engineers predicted.

take charge of the surveys, &c. for determining the location within the city of Baltimore, the execution of drawings and calculations explanatory of the several routes surveyed and located, the preparation of reduced charts of all the surveys made on account of the Rail-road, the examination of accounts and other office duties.

The President of the Company who was, ex-officio, a member of the Board of Engineers, and as such endued with the power, although destitute of the skill of a professional engineer, in addition to the prerogatives which he already possessed as President of the Company, was now virtually installed, at his own request, in the office of Engineer, and invested with full power to direct all the operations relating to the formation of the road-bed. Although this measure evidently wears the aspect of extreme absurdity, it is nevertheless compatible with the following provision contained in the second article of the regulations (See Doc. L.) viz: "*instructions from a member of the Board will at all times be received as from the Board.*"* and the present exigency seemed to require that something of the kind should be done in order to sooth the ill boding apprehensions of the President of the Company. Nor could the President of the Board of Engineers seriously object to the measure, inasmuch as he had long since been aware of his utter inability to restrain the abuses and correct the mismanagement which had crept into that branch of the service over which the Superintendent presided.

It will be proper to remark in this place, with especial reference to the use made of the powers conferred, agreeably to the foregoing extract, that Mr. Thomas did, not only assume the pri-

* This clause of the regulations has, by a forced construction, been regarded as clothing an individual member of the Board of Engineers with power to suspend or countermand the orders given by the Board itself; whereas the obvious intention of it was to empower any member of the Board, to give such instructions in cases of emergency, that might not have been anticipated by the Board, as the exigencies of the service might from time to time require, and on occasions when a united consultation of the members could not conveniently be had.

vilege of giving instructions that had never been contemplated by other members of the Board, as may be made to appear in a variety of instances, but that he actually countermanded the orders of the Board given in due form to the Superintendent, and in many cases authorised a departure from all their injunctions, as will hereafter be shown; nor did he appear to think it incumbent on him to apprise the Board of Engineers of the steps thus taken, however deeply their characters might be implicated, or their measures affected by such a course of procedure.

The President of the Company had repeatedly promised to lend his aid and use his influence, in order to affect a satisfactory adjustment of all the difficulties complained of; but nothing of this sort could be done till the return of the absent members of the Board from England, and it was now deemed advisable patiently to await that event.

While these matters were under discussion, Mr. Thomas gave to Col. Long the strongest assurance that words can express, that he would use his utmost endeavours to prevent all future acts of disobedience to the orders and instructions of the Board of Engineers on the part of the Superintendent. *He even* PLEDGED HIS WORD AND HONOUR *that in case the Superintendent should on any occasion disobey the orders of this Board, he would be the first to advocate his dismission from the service of the company.*

Dec. 15, 1828. The monthly estimate due from the Superintendent on the first of this month, was this day submitted to the Board of Engineers. This document contained no statement of the force employed on the several sections of the road, although this was an item specially designated in the form furnished him by this Board. It was not accompanied by a monthly report setting forth details relative to the progress of the work. The following *remarks* appended to the estimate contained all the information given on this subject. "Sections No. 3, 6, 14 and 16, may be regarded as finished. H——— and T——— *have been dismissed* from the ninth section *on account of abandoning their work.* It is rumoured that N——— C——— has abandoned the 11th section. The 9th section has been placed in the hands

of H——t——n and E——r——. The work generally exhibits as good a state of progress as could reasonably be expected, under all the circumstances which have had an influence upon it. There are about eleven hundred men employed on the whole line. The masonry goes on slowly, but better masons are expected shortly.'

With such shreds of intelligence, for want of more satisfactory reports from the Superintendent, the Board of Engineers must again rest satisfied that another $30,000, had been economically expended, and they were again called on for an appropriation of an additional sum, of equal magnitude, which must be granted or the work must stop.

The field operations, relative to the various surveys made on account of the Rail-road, between Baltimore and Williamsport, were concluded about this time. Reports had been forwarded, from time to time, explanatory of the progress made in these operations, and exhibiting, in detail, the results developed by the surveys. On reference to these reports it appears, that the numerous lines run by the party that had been operating between Parr spring ridge and Williamsport, embraced an aggregate distance of 262½ miles. In addition to these surveys, a definitive location had been made by the same party, from Chapel ridge to the Upper Point of Rocks, embracing a distance of [illegible] miles.—The number of stations taken amounted to 6469. The cost of these surveys, exclusive of any compensation to the officers of the army engaged thereon, who received none from the Company, amounted to $4,049 03. These operations were commenced on the 15th of April and terminated on the 31st of December 1828. Plans and profiles illustrative of the surveys, were executed in the field and forwarded to the Board, as soon as completed.

The surveys and locations made by the party engaged on the route between Baltimore and Parr spring ridge, were reported in detail as the work advanced. The aggregate extent of the lines surveyed was 75 miles, of which 23½ miles is the distance embraced by the location between the "first stone" and the Forks

of the Patapsco. The number of stations taken, during the progress of these surveys, was 2378, besides, a great number of others that were taken, on numerous experimental lines run from time to time, for the purpose of ascertaining the least expensive position for the road, of which no record was made.—These surveys were commenced on the 15th of May, and terminated on the 31st December 1828. Their cost, exclusive of any compensation to the officers of the army as above excepted, was $3,757,70. The drawings illustrative of these surveys were now in progress.

December 19, 1828.—The Superintendent having repeatedly absented himself from the duties of his station, without permission from the Board of Engineers, or even the slightest previous notice of his intention to do so—and it having been casually ascertained by the President of the Board that he intended again to be absent for some time on a second visit (probably of business) to the state of Ohio—that officer [Col. Long] deemed it his duty to remonstrate against such a course of procedure on the part of the Superintendent, and accordingly prepared a protest to that effect, (See Appendix Doc. T. 1.) which he presented for the consideration of the Board of Engineers. The protest was however withheld at the urgent solicitation of the President of the Company who urged, in behalf of the Superintendent, the pressing demands of certain business connected with the final settlement of the accounts between Mr. Wever and the United States, in reference to the Cumberland road. Mr. T. also insisted that a stipulation had been made prior to the appointment of Mr. Wever to the Rail-road service, by which the latter was entitled to the privilege of being absent for the purpose above mentioned. On the other hand, and in reference to the position advanced by Mr. Thomas as just stated, Col. Long, who had been exclusively entrusted with the correspondence between the Board and Mr. Wever, up to the date of the appointment of the latter, stated that no stipulation of the kind alluded to had ever, to his knowledge been provided for or even alluded to, in any of Mr. Wever's letters, till after the date of his appointment.

The only allusion made to this subject in the letters of Mr. Wever, was contained in a communication under date of March 29, 1828, in which Mr. Wever proposes the following query.—"Could I be spared from the service for a few weeks, after the work shall have been under full and successful operation?"—which query was predicated on the supposition that his services were to commence on the 1st of June instead of the 1st of July, at which last date he entered upon the duties of his appointment.

At the date of the protest, (Dec. 19) Mr. Wever had been ostensibly in the service of the Company 5½ months, during which time he had made two visits to Washington, and one to Ohio, which had occupied nearly two months of that time—the latter visit having been undertaken, when as yet almost nothing had been done towards the work, instead of being in "full and successful operation." Well might the President of the Board be alarmed at these repeated unprivileged and injurious derilictions of duty on the part of the Superintendent.

Dec. 24, 1828.—Permission having been granted by the Legislature of Pennsylvania, at their last session, for conducting the Rail-road within the limits of that state, a resolution (See Appendix Doc. U. 1.) was this day passed by the Board authorising an examination of the country situated between the Potomac and Youghaghany rivers, for the purpose of ascertaining the most feasible route for a Rail-road between these two streams, so far as this object might be effected, without the aid of actual surveys. This service was confided to Lieut. Trimble, who was furnished with instructions for his guidance, by the President of the Board. (See Doc. U. 1. just cited.)

About this time Winan's car made its first appearance in Baltimore, eliciting the admiration and raising the enthusiasm of the most zealous friends of the Rail-road to a pitch seldom equalled. This machine, whatever its merits might be in other respects, was admirably calculated to please the fancies of unskilful observers, and soon drew forth, not merely the unqualified approbation of the President and Directors of the Company, but the wildest ejaculations of astonishment at the wonders it would in-

evitably perform, and the surprising revolutions it would produce in the commercial world. The President of the Company entertained not only the belief, but the sure conviction, founded upon the indisputable evidence of his own senses, that a horse could draw on a car of this description *thirty tons*, at any rate of speed at which he could travel—even to eight or ten miles per hour. In fine its *powers* were such, in his estimation, that the effects of motive power, applied in this way, were absolutely incalculable. The right to appropriate the invention to the uses of the Rail-road company was offered for a thousand dollars, together with one dollar annually for each car employed on the road. The proposition having been made to the Board of Directors, to use the language of Mr. Thomas, "*it was carried by acclamation.*"

The Directors had already applied to Congress for a subscription, on the part of the General Government, to the stock of the company. The amount expected to be subscribed, was a million of dollars. Every exertion was made, and every plausible means adopted to accomplish that object. The favorable impressions produced on the minds of some of the Directors by Winan's car, led them to suppose that its exhibition at Washington would be attended with similar results on the minds of the members of Congress.

The model car was accordingly despatched to Washington, succeeded by a deputation from the Directors, accompanied by the President of the Board of Engineers.

A lucid statement of facts exhibiting the comparative merits of Rail-roads, canals, and other means of internal transportation; the principles involved in their construction compared with their relative efficiency; the economy of their use; their comparative durability; their adaptation to climates; their facilities of repairs, and renovations, &c. &c. would have been far better calculated to illustrate the advantages derivable from Rail-roads, than the display of a mere pigmy car, manœuvred by silken threads.

We would not be understood, however, as having the least intention to disparage the merits of the invention. On the contrary, we have ever regarded it as one of the best displays of *friction-saving machinery* that we have ever seen; and we have no doubt that Rail-road cars constructed in a manner to embrace its principles, would, on roads *perfectly horizontal*, be attended with an advantage of about thirty-three and one-third per cent. over ordinary Rail-road carriages. The efficiency of the principles involved in its construction, independently of any allowance for the friction of rolling, as also that attendant on the impact of the shoulders, and extremities of the axles, is deducible as follows, viz: Let the diameter of the main carriage-wheel be three feet; that of its axis three inches; that of the secondary or friction wheel, nine inches, and that of its axis one inch; also the friction of iron sliding on iron, with smooth surfaces, be regarded as equivalent to one-sixth of the weight of the sliding body, then the amount of friction at the axis of the secondary wheel, compared with the entire weight or load in motion, on a level road, will be expressed by the following compound fraction, viz: $\frac{1}{9}$ of $\frac{3}{36}$ of $\frac{1}{6}$, equal to $\frac{1}{648}$, which expresses the relation of the friction to the load, abstractedly considered. To this may safely be added an equal quantity on account of friction at the shoulders and ends of the axles; of friction occasioned by rolling; of resistance occasioned by elasticity in the materials of which the rails and wheels are composed; of resistance occasioned by impacts of the flanges of the wheels against the rails; and of the ends or shoulders of the axles against the secondary wheels, making the aggregate resistance on these accounts equal to $\frac{1}{324}$ of the load. Moreover, to this amount may be added its one-sixth for inequalities on the surface of the rails, dust, gravel, &c. and we shall have as the final result, showing the probable efficiency of Winan's car, $\frac{1}{970}$ of the weight or load nearly; which implies that a stress or traction of one pound is sufficient to move two hundred and seventy pounds, or that three horses operating with Winan's cars, on a road *perfectly level*, will be able to

perform the work of four operating with ordinary cars, the resistance of which, from the causes above enumerated, is estimated at $\frac{1}{200}$ of the load.

With respect to the comparative prime cost of these two descriptions of cars, Winan's may be fairly estimated as costing at least fifty per cent. more than the other; and with respect to their comparative durability, the advantage may, with equal propriety, be estimated at 66⅔ per cent. in favour of the ordinary car.

As an example of the efficiency of Winan's car, we refer to an experiment made on the Rail-road with a carriage of this description, constructed under the immediate direction of Messrs. A. Brown & Son, and employed in removing earth from the deep cut. It had travelled with a load through an aggregate distance not exceeding five hundred miles, and became unfit for further use. The ends of the main axles were worn into a hemispherical shape, and the interiors of the rims of the secondary wheels were much impaired. This however cannot be regarded as a conclusive test of the efficiency of the plan, for various reasons, which need not be enumerated at this time.

We shall dismiss this subject with the following brief remark, that Col. Long would not admit that this invention possessed the extraordinary *advantages* and *powers* ascribed to it by Mr. Thomas and other Directors, and that the weakness of his faith in this respect, contributed probably more than any other circumstance to impair their confidence in his abilities and their respect for his judgment.

January 13, 1829. The quarterly accounts of the several officers charged with the disbursement of funds on account of surveys, construction and contingencies, during the last quarter of 1828, were this day submitted by the President of the Company, to the Board of Engineers, for the inspection and approbation of the latter. The accounts of Lieuts. Cook and Gwynn, in relation to surveys, and those of Mr. J. N. Brown, in relation to contingencies in the city of Baltimore, so far as the latter were deemed cognizable by this Board, were examined, found in ac-

cordance with the regulations, and approved. These accounts were executed in due form, and exhibited clearly the objects of expenditures, and the sums paid therefor respectively.

The accounts of the Superintendent not having been accompanied by vouchers duly authenticated and not exhibiting specifically the nature and extent of the objects for which payments had been made, could not be passed by the Board in their present shape and were laid on the table for future consideration.

Jan. 17, 1829. Mr. Thomas this day submitted a communication from the President of the Company, inclosing a transcript from the proceedings of the Board of Directors, which was as follows:

"At a meeting of the Board (of Directors) 5th January, 1829, it was on motion, Resolved, that stone viaducts be constructed across Warfield's lane and mill race, and also across Gadsby's and Stillhouse runs, on the 9th, 10th and 12th sections of the first division of the road."

In conformity to this resolution, instructions were issued to the Superintendent, (See Appx. Doc. W. 1.) directing his attention to the works therein authorised, and requiring him "to report to this Board, for their inspection and approbation, any plans of bridges he may think best adapted to the purposes above contemplated, with the requisite explanations illustrative of their dimensions, manner and form of construction."

No steps preparatory to the adoption of these measures had been taken by the Board of Engineers, nor is it known through what channel they were recommended to the Directors. The first intimation received by Col. Long, that stone structures were to be erected at these places, was given by Mr. Thomas at the time when the communication was presented, and the only reason alleged for their construction was, that the Directors were resolved not to admit any wooden structures on the first division. It is believed that no plans or estimates in relation to these structures were ever submitted to the Directors. The Board of Engineers surely were never called on for their opinion in reference

to these structures, nor had they ever recommended the construction of stone bridges, at these places. Whether the Superintendent advised their construction or not, is uncertain; it is however true, that he did not deign to notice the instructions given on this occasion.

Jan. 26, 1829. The accounts of the Superintendent for the last quarter of 1828, were again taken into consideration, having been previously examined with care, by the President of the Board of Engineers who had appended to them the following remarks, which were addressed to the President of the Company:

"The accounts of the Superintendent due at the close of the preceding quarter, have been submitted to the Board of Engineers for their inspection and approval; but, on examination with a very few exceptions;" (not more than two which were designated by pencil marks endorsed upon them,) "have been found informal and defective, not having been rendered in accordance with the provisions of the regulations for the Engineer Department as contained in the 7th article of that instrument. (See Document L.)

In reference to certain informalities and defects in the accounts for contingencies, the following extenuating circumstances were introduced in the remarks. "It may be urged with some degree of propriety, that various items of expenditure, such as public notices, payments for damages, tolls, postage of letters, transportation, and a few other charges of a similar nature, are purely contingent, and ought not to require any other voucher except the certificate of the disbursing officer that the payments were actually made for, and in behalf of, the proper service of the Railroad Company.

"But, in regard to payments on account of construction, *their exists no obstacle in the way of a full and clear statement of the work done, and for which payments have been made.* For example, the amount of grading whether in cubic yards or in running measure, is always estimated before a payment is made, as also the amount of masonry actually laid, and stone delivered in perches; the amount of labour of all kinds performed on the road

should be distinctly known and stated at the time of payment. Accordingly these amounts, whatever they may be, should constitute items in the vouchers that ought invariably to be taken, in order to account clearly and satisfactorily for the disbursement of the funds of the Company.

"The accounts of the Superintendent are not supported by vouchers of this character, nor do they furnish the means of judging as to the quantity of work done, or the nature and extent of the objects for which payments have been made, and there is not, in connexion with them, any certificates, except in a single instance, bearing the signature of the Superintendent, and corroborating the appropriate expenditure of the funds intrusted to his care.

"It is not therefore within the province of the Board of Engineers to approve the accounts of the Superintendent, in their present form."

In connexion with this subject it should be observed, that Mr. Thomas, at the instance of Mr. Wever, had about the middle of December last signified a desire to employ some of the assistant engineers, as assistants to the Superintendent, and at the same time stated, that an allowance of $3 per day each, would be made to such of the officers as the Superintendent thought proper to select for this purpose. Col. Long at first objected to the proposition, inasmuch as it was likely to be partial in its operation. He was of the opinion that the duties of those engaged in surveys, locations, &c. were equally as arduous, and gave to the officers claims to a compensation, equally as strong as any duties connected with the work of construction could give, and that it would be invidious and ungenerous to award a compensation in the latter case and deny it in the former. Accordingly if any remuneration was allowable, he was in favour of its being dealt out equally to all the officers, at such a rate as might be deemed proper, by the Board of Directors. Mr. Thomas on the other hand, after reiterating the obligations which he had, on numerous occasions, acknowledged himself and the Company to be under to the officers assistant, for their faithful and zealous services, went on

to remark, that employment could not be given to more than two or three of the officers at present. But that as the work advanced, there would be occasion for more, and he should suffer no opportunity of affording them encouragement, to escape his notice. The Superintendent was very desirous of obtaining the assistance of two or three of the assistant engineers, whose services he wished to be placed entirely under his controul. To these, *while they remained on duty with the Superintendent*, Mr. Thomas was willing to allow the compensation above mentioned, but did not feel himself authorised to make or encourage any allowance to those engaged in surveys!! He moreover intimated, that unless this proposition were acceded to, the Superintendent would introduce others into the service, to the exclusion of the assistant engineers whose pretensions were in all respects superior, and who had a fairer claim to the consideration and patronage of the Company. Col. Long after having deliberated awhile on this strange proposition, and reflected on the importance of having skilful and competent agents in whose measurements, computations, &c. implicit confidence might be placed, at length consented to the employment of such assistants as the Superintendent might select from among the officers.

Lieuts. Cook and Gwynn were accordingly chosen, and these officers, together with Lieut. Dillahunty, who had been employed on the work of construction from its commencement, were now serving as assistants to the Superintendent. To these officers was confided the supervision and measurement of the grading. Estimates of the amount of work done were made every month and handed over to the Superintendent, who made his payments accordingly.

The superintendence of the mason work had been entrusted, from the beginning, to Mr. Robert Wilson, a young man of great industry, activity, and intelligence in this branch of business. He was equally prompt and punctual in making measurements, and statedly rendering to the Superintendent returns of masonry, stone delivered, &c.; except in particular cases, in

which *the Superintendent chose to dispense with measurements* and to "judge from observation alone!!"

Thus it appears that the Superintendent not only possessed the means of giving all the information required in conformity to the regulations, and to the views of the President of this Board, but actually had in his possession the very facts so desirable and necessary to establish the authenticity of his accounts. How could these facts be withheld consistently with honest views and upright intentions, and with an ingenuous and faithful discharge of the duties of his station?

On the date above mentioned, (January 26,) the President of this Board submitted a paper designating the steps proper to be taken, in order to enable the Board to decide understandingly upon the propriety of the disbursements made by the Superintendent, and upon the validity of his accounts. The object was not at this time to remodel the accounts, or to prescribe the forms that ought to be observed in keeping them, but to obtain such a designation of the objects upon which expenditures had been made, as would enable the Board to show clearly and conclusively the amount of work done, or the value received for the payments made.

The paper alluded to, although precaution was taken to avoid every appearance of invective in inditing it, yet in the opinion of Mr. Thomas, contained certain expressions which might be offensive to the Superintendent, and he wished them stricken out or altered in such a manner as to render the document more "*mild and conciliatory.*" The alterations proposed by Mr. Thomas were all approved by the Board, and the paper thus amended was unanimously adopted, and ordered to be forwarded as instructions for the guidance of the Superintendent. This document is exhibited at full length in the Appendix, (See Document X. 1.)

The requisitions contained in the instructions above referred to, were briefly as follows, viz:

1st. A statement of the amount of work done on each contract, agreeably to actual measurements made by the assistants of the Superintendent.

2d. "A statement of the contracts entered into, setting forth the names of the contractors; the localities contemplated by the contracts; the nature and stipulations embraced by the contracts; and the amounts actually paid on each contract."

3d. A statement of any extra allowances, made on any account; the nature and reasons of such allowances, and the authority for making them.

4th. A statement of the names, capacity, and term of service of the several assistants; together with the rates at which they served, and the amounts paid them.

These instructions were accompanied with appropriate forms, showing the manner in which returns might be made, embracing the several items of information necessary to establish the authenticity and validity of the accounts already rendered by the Superintendent.

The amount already placed in the hands of the Superintendent, and expended by him, was no less than ninety thousand dollars. The dearth of information, occasioned by his unwarrantable reserve and neglect of duty, was such, that it was impossible for the Board to know definitively upon what objects this amount had been expended, or to judge with any precision of the progress made in the work. The nature and substance of all the information received, has already been a subject of animadversion, under date of November 11th, and December 15th. An effort was now made to obtain the information which ought to have been communicated in monthly reports, and which the Superintendent had the means of communicating, if he had been so disposed. The information sought for was essential to a knowledge of the state and progress of the work, and every honest endeavour on the part of the President of this Board, was used in order to obtain it.

Yet all efforts for the attainment of this very desirable object proved fruitless. The information was still obstinately with-

held, and notwithstanding the pledge of Mr. Thomas, as exhibited under date of the 9th ultimo, the Superintendent was indulged, and even sustained, in open violation of the instructions above mentioned. (See Document X. 1.) Even the duties enjoined by these instructions, were subsequently pronounced "*onerous and unnecessarily expensive*" by a committee of the Directors, as will hereafter appear.

CHAPTER V.

Of the location of the Rail-road within the city of Baltimore.—Report on the same.—Report on the progress made in the surveys and construction of the Rail-road.—Embarrassments attending its preparation.—Estimates furnished by the Superintendent.—Their defects and irregularities.—Quarterly accounts.—Those of the Superintendent objectionable.—No report on the state of the work, nor on the nature and terms of contracts.—No statement of the quantity of masonry done.—Misapplication of funds in reference to the Patapsco bridge.—Amounts borne on returns of Superintendent.—Remarks on Superintendent's accounts.—Accounts passed by committee.—The mischievous effects that must ensue.—Grading of part of the third and city divisions authorised.—Instructions of the Board disregarded.—Report on the surveys through Frederick county.—Col. Long's reason for withholding his resignation.—Return of the mission from England.—Their views of the plans adopted.—Mr. Thomas resigns the supervision of the operations of Superintendent.—Remarks on the administration of the affairs of the company.

In the farther prosecution of this narrative, we shall, for the sake of brevity and perspicuity, adopt a course somewhat different from that heretofore pursued, in disposing of the subjects deemed worthy of attention. Instead of confining ourselves to the chronological order in which occurrences have taken place, we shall select merely the principal events, and

trace them through a definite space of time. The period selected for the present chapter, commences with the last date given in the preceding chapter, (January 26th, 1829,) and terminates with the return of the mission from England, which took place on the 22d of May, 1829.

The first subject presented for our consideration, in the order now to be observed, is "*The prolongation of the Rail-road from the first stone to tide-water within the city of Baltimore.*"

In regard to this interesting subject, which has ever been considered with deeper concern by the citizens of Baltimore than any other of a secondary nature, connected with the Rail-road, unwearied pains had been taken to collect all the information attainable, for the purpose of arriving at a knowledge of the direction proper to be pursued by the Board, in its passage from the "first stone" to some suitable point of termination within the improved parts of the city. In addition to the surveys made at the commencement of the last season, upon which the conclusions in the report of this Board, under date of June 23d, 1828, (See First Annual Report of the Board of Engineers, pp. 41 to 48) were based, other surveys were undertaken in the latter part of December, 1828, for the purpose of acquiring more definite information as to the appropriate locality of the route; and having been zealously prosecuted till they were unavoidably arrested by the severity of the weather, the Board of Engineers were enabled from the result thus obtained, to decide upon an approximate location of this part of the road. A report was made by order of the Board of Engineers, under date of January 31st, 1829, to the Board of Directors, (See Appendix Document Y. 1.) in which the conclusions arrived at by the former, and the considerations that led to these conclusions, were distinctly stated.

It should be recollected that according to the instructions from the Board of Directors, which have been recorded in this narrative, under date of December 4th, 1828, the route to be selected must be prolonged to tide-water, and be such "as to admit the *distribution of the trade of the road throughout all parts of*

the city as now improved;" also that the order, taken by the Board of Engineers in reference to this subject, (See Appendix Document N. 1.) specified as the line to be surveyed, a route leading from the first stone to Jones' falls, "as described in the report of this Board, dated June 23d, 1828, (See First Annual Report, as above cited,) in which the following points are particularly designated, viz: "*a point on Lexington street*, near its intersection with Chatsworth run, *and a point on Centre street*, in the vicinity of the Washington monument.* The obvious and unavoidable inference to be drawn from these statements is, that it was well understood by the Board of Directors, and unanimously agreed to by the Board of Engineers, that the Rail-road must pass through Lexington hill, by means of a tunnel or otherwise, and accordingly the passage of this hill was made a leading consideration in the report now submitted (January 31st, 1829,) to the Board of Directors, and was in fact regarded on all hands, not only as indispensably necessary to "the accommodation of the city (both east and west) as now improved," but as the only circumstance that would justify the selection of the route at present occupied by the road between Baltimore and the Deep cut, or the elevation (sixty-six feet above mid-tide) fixed upon both by the Engineers and Directors, at which the road should enter the city, (See Second Annual Report of the President and Directors to the Stockholders, p. 8.)

With views and impressions like these, the report above mentioned was laid before the Board of Directors, and by them submitted to the City Council, and was made the basis of an arrangement between those two bodies, by which the Rail-road might be conducted from the "first stone," to some point on

* These points had been selected and designated, and the decision of the Board of Engineers in relation thereto, had been distinctly made known to the Directors at the date above mentioned; subsequently to which no intimation had been given by the Directors of their dissatisfaction with the route leading through these points, until more than a year afterwards; nor had the Board of Engineers discovered any reasons for changing their opinions as to the propriety of a route thus located.

Baltimore or Market street, still enjoining that an elevation of sixty-six feet above mean tide, should be maintained.

This of course was regarded as a temporary arrangement, inasmuch as it contemplated a termination remote from tide water, and at an elevation sixty-six feet above it; in conformity to which the road *could not be prolonged to tide water.* A subsequent arrangement was expected to be made, based upon the principles, and involving the conclusions, taken into consideration at the time when the elevation above mentioned was adopted, and the report under consideration was prepared and submitted.

Nothing farther was done in reference to the definitive location of the road within the city, till the 20th of April following, when surveys were resumed in conformity to instructions from the Directors under the immediate direction of the President of this Board, for the purpose of ascertaining the comparative merits of several routes that had been recommended, passing in the vicinity of that designated in the report already referred to. (See Appx. Doc. Y. 1.)

The necessary surveys having been completed on four additional routes, at the date above mentioned, April 20, 1829, as also the drawings illustrative of their several characters, and the computation showing the amounts of excavation and embankment, on each; another report was prepared by Col. Long, explanatory of the manner of conducting the Rail-road into the city by these routes. (See Appx. Doc. Z. 1.) In this report it is distinctly stated that "these several routes unite near the intersection of Lexington and Pine streets, and *may all be prolonged through Lexington hill by one common route,* as reported on the 31st of January last."

Report on the progress made in the surveys and construction of the Baltimore and Ohio Rail-road, and of the expense accruing therefrom, prior to the 1st of January, 1829.

At an early date in February, 1829, a call for information of the foregoing import, was made in behalf of the Legislature of Maryland, which must be promptly and satisfactorily complied with. The condition into which the affairs of the Rail-road

were brought at the close of the preceding year, were such as seemed to bid defiance to any efforts that might be made at a full and correct exhibition of the intelligence required. The documents in the possession of the Board of Engineers, in reference to the SURVEYS, were sufficiently explicit for the purpose. From these the extent of every line that had been run, the time required for running them, and even the number of stations taken, could be ascertained; as also the amounts paid on account of surveys, delineations, &c. But with respect to the work of *construction*, the Board of Engineers had nothing more to show from any documents in their possession, than simply the amount that had been appropriated. As yet they had received from the Superintendent no returns, setting forth the quantity of work done, whether of grading or masonry; nor had they at present the means of making the measurements necessary for that purpose, in season to answer the call. In this dilemma, Mr. Thomas made a forcible appeal to Col. Long, for his assistance. He set forth in glowing colours the evils that were to be apprehended from a failure to meet the demand of the Legislature, and give them all the information required. Col. Long observed that the system he had been labouring to introduce, would have kept the Board in constant preparation for any emergency of this kind, and so far convinced Mr. Thomas of the propriety of such a course, that the latter voluntarily laid himself under a promise that he would do any thing in his power to introduce such a system, if Col. Long would help him out of his present difficulties.

Accordingly, measures were immediately taken to ascertain with all practicable precision, the amount of work done. The Superintendent was now absent, and recourse was had to his assistants, as the only channel through which the information could be procured. As good fortune would have it, these gentlemen, viz: Lieuts. Cook, Gwynn and Dillahunty, assistant Superintendents, and Mr. Robert Wilson, agent of masonry, had retained the rough notes of their measurements, copies of which, they had from time to time furnished to the Superintendent, and were by these means enabled to exhibit statements of the amounts of *grading, and masonry*, that had been done on the road.

After much assiduous labour and careful calculation, the necessary details were obtained, and a report framed thereon by Col. Long, which was prepared and submitted in due form, and proved acceptable and satisfactory to the Legislature. This report, and *one out of five manuscript documents* accompanying it, were printed with the proceedings of the Legislature.

Of the Estimates furnished by the Superintendent and others.— No estimate was furnished by the Superintendent for the month of January 1829, nor any other document in relation to the work of construction, or the payments made therefor, except the accounts &c. rendered Jan. 13th, objected to as inadequate and defective under date of Jan. 26. On the 20th February, an estimate covering the expenditures incident to the purposes of construction, for the months of January and February, was presented, and passed, although more defective and objectionable than any preceding estimate received from the same source. The only means now possessed by the Board, for judging of the propriety of placing funds in the hands of the Superintendent, were those employed in framing the report just before considered. Among other items of information procured for that purpose, it was ascertained that the aggregate force employed, was about one thousand men, besides horses, &c. The probable amount required to reimburse them for their services, and to defray other expenses, was thought to be about $30,000 per month. The estimate under consideration called for $50,000, and the same was accordingly placed to the credit of the Superintendent; making the aggregate amount already set to his credit $140,000, none of which in the opinion of Col. Long, had been satisfactorily accounted for.

On the 2d of March, a return was received from the Superintendent, showing the sums expended during the preceding month but containing no statement of the funds required for the current month, except that the balance still on hand, was deemed sufficient for that purpose. Agreeably to this return, the amount expended in February was $21,127 18.

On the 4th of April, 1829, an estimate was again received from the Superintendent calling for an appropriation of $40,000, and was approved although of a character no less exceptionable than that of its predecessors. The aggregate amount now set to the credit of the Superintendent, and not accounted for agreeably to the regulations and instructions that had been given him, was $180,000. No report had as yet been received defining beforehand the objects of expenditure or explaining the nature or extent of the objects for which payments had been made. In fact, no measurement of the amount of work done, except those referred to under the preceding head, as having been furnished by the assistants, had as yet been communicated to the Board of Engineers.

All estimates on account of surveys and contingencies in the city of Baltimore, were as usual rendered in due form, and approved. Those on account of surveys, from Jan. 1st to April 30th, amounted to $648 50. Those on account of contingencies for the same period amounted to $1845.

Of the quarterly account, &c. rendered by the Superintendent and other disbursing officers.

Notwithstanding repeated calls had been made upon the Superintendent for information relative to *the nature and provisions of contracts*, the quantity of work done, as deduced from measurements, known to have been statedly made, the amounts paid therefor, and those still remaining to be paid, &c. &c. no returns had hitherto been made of the description required, nor was it possible for the Board to form an opinion as to the progress made in the work of construction, or its actual cost, from any communications made by the Superintendent, prior to the close of the first quarter of 1829.

Early in April 1829, certain documents designated "estimates of the graduation and masonry, done on the first and second divisions, of the Baltimore and Ohio Rail-road, prior to March 31st, 1829," were furnished by the Superintendent, and contained all the definite information ever given by him, in reference to the nature of contracts and the progress of the work.

The "estimates" of grading done on the first and second divisions, exhibit the names of the contractors, the locality of their contracts with respect to the sections on each division, the quantity of grading done on each section in cubic yards, or poles, according to the manner in which it suited the Superintendent to farm out the work of construction, the price per cubic yard, or pole, the value of the work done on each section, the value of the work done on *each contract*, including one or more sections, and the amount paid on *each contract*, together with a statement of the force employed, including labourers, teams, &c. This document, although not framed in accordance with the express instructions of the Board, and not being accompanied by a monthly report or any other document, setting forth the nature and stipulations of the contracts reputed to have been made, nevertheless was regarded as exhibiting an approximate view of the actual state of the grading at that time, and the progress made in this branch of construction.

The documents, in order to have been duly authenticated, ought to have been accompanied at least with a statement showing the nature and terms of the contracts, and by vouchers from the persons charged with making the measurements of the work done, certifying that the measurements had been accurately made. For how could it be supposed for example, that Mr. Wever, who had never once inspected the second division, during a period of *more than three months*, included within the time contemplated in the documents, could decide with any precision upon the amount of work done on that division!!!

Appended to the "estimate" for the first division, and under the head of "Remarks," the following statements were made in reference to the deep cut. "It will be *proper to remark*, that payments of $38,425 upon these sections (four and five) were made in express reference to the *peculiar terms of the special agreement* entered into, with the *contractor by the Board of Engineers*, and also with a view to the subsequent *modification of that contract by Mr. Thomas*; there being no positive specified price established in those agreements, the *payments were left discretion-*

ary with the Superintendent; and in advancing the money to the contractor, *he has constantly acted with the concurrence of Mr. Thomas.*"

With regard to any agreement entered into between the Board of Engineers and the contractor, with respect to the deep cut, it was no more than a mere acceptance on the part of the Board, of certain proposals, by which the contractor offered to execute the work for eighteen cents per cubic yard, provided an extra allowance at the discretion of the Board of Engineers and Superintendent, should be made, in case the earth should prove too hard to be removed by the plough and spade. The Board of Engineers did not regard this as a *contract*, but as the acceptance of a proposal on which the Superintendent might base a contract.

In regard to the *modification* of the contract by Mr. Thomas, the Board of Engineers had no knowledge that any such modification had been made, or that Mr. T. had been vested with power to make it. On the contrary, Mr. Thomas and the Superintendent, had been "authorised *to estimate* such additional compensation for the work already done, or which may hereafter be done upon those sections, as in their judgment shall be equitable and just, in conformity to the provisions stated in the proposals above mentioned, also that they report thereon *at an early date.*" (See Appx. Doc. Q. 1.) At the time this arrangement was made, it was expressly understood, as well as directly implied by its terms, that the compensation was to be *estimated* merely, and that *no payments were to be made*, but by the express sanction of the Board, predicated on the report which was required "*at an early date.*"

As to the *payments* having been left *discretionary with the Superintendent*, it does not appear from the records of the Board, that any such authority was given to that individual, and how he could have obtained it but by express delegation from Mr. Thomas, we are at a loss to account.

The other remarks, made in reference to the first division, merely related to certain unauthorised changes of contractors, and certain payments for work performed, especially on the sixth

and twenty-first sections, and of the *reletting* of the section last mentioned, without the knowledge or approbation of the Board.

The "estimate" relative to the grading on the second division (See App. Doc. A. 2.) was even more reserved with respect to the information it exhibited, than that just considered. A few remarks, in reference to the adequacy or inadequacy of the reputed contract prices, were appended to this document, by the Superintendent, the correctness and propriety of which may be inferred from the circumstance of his having never inspected the work on the second division, from its commencement to the date of the estimate.

The "estimate of masonry built, and stone delivered on the first and second divisions of the Baltimore and Ohio Rail-road" which accompanied the documents just considered, proved far less satisfactory than either of the others. This document exhibited merely the sums due and those paid on account of mason work and stone, without the least intimation of the quantity of masonry laid, or of stone delivered, or of the prices at which these items were to be performed. No information had been previously communicated by the Superintendent, in relation to any contracts, or other arrangements that had been made, for the execution of work in this branch of the service, with the exception of that contained in document H, as referred to in the first annual report of the Board of Engineers, p. 13, which had been furnished by Capt. McNeill, while acting in the capacity of Superintendent. Numerous expensive bridges had been farmed out for construction, upon terms as yet unknown to the Board, nor could the price at which they were to be built be inferred from any report of the Superintendent, or any information accompanying the document under consideration.

Among the works commenced in this loose and informal manner, were the Gwynn's falls bridge, (Carrollton viaduct) the bridges on the ninth and tenth sections, the Stillhouse run, Dorsey's run and Buzzard run bridges, the Patapsco bridge (Patterson viaduct) together with all the bridges of the second division; all of which were undertaken without consultation with the

Board of Engineers, and without a conformity to the instructions they had furnished to the Superintendent for his guidance in the construction of bridges.

One of the items borne on this estimate, viz: that, in reference to the Patapsco bridge, is deserving of particular notice, inasmuch as it evinces a partiality not less remarkable than singular, on the part of the Superintendent, for its builder, John McCartney. The value or cost of the work done on this bridge, prior to the 31st March, 1829, is stated to be $3,500; and the amount actually paid at that date is the same. In all the other items the amount paid is uniformly less, by a very considerable difference, than the amount due, or the estimated value of the work.

By a recurrence to the abstract, accompanying the accounts presented by the Superintendent for the first quarter of 1829, it
Doc. appears that the amount paid to John McCartney, was made up of the following instalments, viz: Jan. 17, $500; Jan. 31, $500; Feb. 27, $1000; March 16, $500, and March 31, $1000; amounting to $3,500, reported as having been paid out of the funds of the company. It does not appear that any measurement of the work had ever been made, for which this amount was expended, nor is it believed that the work actually done at the dates of payment, could fairly be estimated at *one fourth the value paid therefor.* In fact there had not been a single stone laid in the bridge, prior to the 15th April; more than $4,000 having been paid to the builder, before the bridge could be said to have been fairly commenced.

The committee charged with the investigation of certain charges preferred against the Superintendent by Capt. McNeill, in October, 1829, in their report of December 22d, hereafter to be particularly noticed, make the following statement, viz:—"Neither does it appear that in *any instances* his (the Superintendent's) payments to contractors *have been made beyond the amount due.*" We are at a loss to know upon what facts such a conclusion, in reference to the case above mentioned, can be grounded. Had the committee demanded records, setting forth the amount of work done, in this case, instead of relying on a

vague and hesitating declaration that estimates of the masonry were made monthly, preparatory to payments to contractors, their conclusion might have been entitled to greater confidence.

In a note subjoined to this document, the Superintendent makes the following statement: "this estimate *does not embrace any work which has been completed and paid for*, nor does it include the work done by Springer." From this or any other communication to the Board of Engineers it was impossible at that time to ascertain any facts in relation to the work here alluded to, or to its cost.

The amounts borne on these documents as having been paid on account of construction, were as follows:

Amount paid for grading on 1st division,				$96,310,00
Amount	do.	do.	2d division,	14,500,00
Do.	do.	for masonry, &c. on the 1st and 2d divisions,		19,602,75
			Aggregate,	$130,412,75

This amount had been expended on such objects, and in such a manner as the Superintendent deemed proper, independently of any direct control on the part of the Board of Engineers, any further than it might have been exercised by Mr. Thomas, who did not think proper to give any information as to the measures he sanctioned while acting as a Commissioner of the Board of Engineers, in carrying on the work of construction.

The returns under consideration, not having been rendered in conformity to the instructions of the Board of Engineers, and being in many respects defective and unsatisfactory, that, in relation to the mason work, in particular, being incomplete and objectionable in every item it exhibited, were not regarded by the President of the Board of Engineers as affording sufficient evidence of the correctness of the quarterly accounts rendered by the Superintendent for the last quarter of 1828, and the first quarter of 1829. Accordingly, on the 7th of April, 1829, the

following order was taken by this Board in reference to these accounts, viz: "The quarterly accounts of the Superintendent of construction, due on the 1st of January and on the 1st of April of the current year, together with the several vouchers attending them, were returned to the President of the Rail-road company, to be disposed of as he may deem expedient."

While the accounts of the Superintendent were under consideration, the following remarks, in reference thereto, were made by the President of the Board of Engineers, under date of April 6th, 1829, and submitted to the President of the company:

"The accounts of the Superintendent of Construction for the Baltimore and Ohio Rail-road, due on the 1st of January last, and on the 1st instant, have been submitted to the Board of Engineers for their inspection and approval. On examination, they have been found, with a very few exceptions, informal and not in accordance with the regulations of the Engineer Department of the Rail-road company. No doubts are, however, entertained," (in fact no doubts did then exist) "that the amounts stated therein have been faithfully applied in furtherance of the work of construction, and that they have been expended on the several objects adverted to in the several documents marked as vouchers.

"In order to corroborate his accounts, the Superintendent has submitted estimates of the amount of grading done on the first and second divisions of the Rail-road, together with the aggregate cost of masonry on both divisions, the amount or quantity of which last has not been estimated, so far as appears from the returns made by him.

"Copies of the estimates alluded to, are herewith presented, from which the amount of work done in reference to the grading of the road may be inferred, as also the rate and aggregate cost of such work. The amount paid for masonry agreeably to the return of the Superintendent, is nineteen thousand six hundred and two dollars and seventy-five cents, exclusive of work completed and paid for in full. The propriety of an accurate measurement of the masonry, is respectfully submitted; as also the *adoption* of a set of forms in the accounting department,

from which not only the monies paid, but the nature and extent of the objects of disbursement may be clearly inferred.

Mr. Thomas, with a view to the final adjustment of the accounts in question, called a meeting of the committee on accounts, and requested the President of the Board of Engineers and the Superintendent to be present with the committee and himself during their discussions relative to the passage of the accounts. At this meeting the accounts were produced, together with the several documents before mentioned. Mr. Thomas opened the case by stating that there appeared to be an "*honest difference of opinion between the President of the Board of Engineers and the Superintendent*," with regard to the validity and sufficiency of the vouchers and documents furnished by the Superintendent, and explanatory of the nature and extent of the objects upon which expenditures had been made by the latter. For his own part, he was of opinion that the information furnished by the Superintendent, was sufficiently conclusive to enable the committee to pass the accounts, although they had not been approved by the Board of Engineers. The President of this Board had raised objections to their approval, so far as he could judge, rather on account of their not having been rendered agreeably to certain forms, than on account of any suspicion that the funds had been improperly expended. Col. Long observed that the papers furnished as vouchers, were nothing more than mere receipts of money paid, in which the objects of the payments were not defined. That the contracts contemplated in the "estimates" above mentioned, in numerous instances, embraced several sections, more or less remote from each other; and that payments respectively made, for work done on these sections could not be inferred from the returns of the Superintendent. For example, the first contract referred to in the "estimate of graduation on the first division," embraced section No. 1, at thirteen and an half cents per cubic yard: Section No. 2, at fourteen cents per yard: Section No. 9, at twenty cents per yard: Section No. 10, at the price last mentioned. The aggregate amount paid on these sections, was $28,640, from which the

particular amount, paid on any section, could not be inferred. The same was also true in relation to various other heavy contracts. Col. Long farther distinctly stated before the committee that, in regard to the returns of masonry, the quantity of work done was in no case exhibited, every column of the estimate, excepting those specifying the divisions and sections, exhibiting merely values in money, without any statement of the amount of work done, (See Document A. 2.) He had no objection to admitting the facts recorded in the returns, as far as they went, but could not regard them as affording conclusive evidence of the correct expenditure of the funds of the company; inasmuch as they did not "set forth the nature, quality, price, and other circumstances connected with the expenditures," and which were deemed necessary to a clear view of the subject," and inasmuch as they were not accompanied by certificates, "declaring that the services, for which payments had been made, were performed." Mr. Wever stated that his accounts were kept, and his returns rendered in the same manner that he had been accustomed to observe in accounting for the disbursement of the funds expended, in the construction of the National road from Wheeling westward; in which service he had expended hundreds of thousands with less ceremony than was now required of him in the disbursement of the comparatively small amount now to be accounted for. With regard to certificates, they were of no consequence; for if he or any one else were disposed to embezzle the funds of the company, he could as easily make false certificates as misapply the funds placed at his disposal.* He

* This reasoning, the reader will readily perceive, would equally prove the uselessness of any receipt whatever, and that a receipt for a mere sum, is no proof of the correctness of an expenditure. It is only by an observance of those forms, essential to the integrity and intelligence of an expenditure that its correctness can be ascertained, or the right of the Superintendent to make it. What proof is a receipt for ten thousand dollars, that the amount was paid for an object authorised, or at a price agreed upon, or under any particular contract, for a bridge, or road, excavation, embankment, material or masonry, and to whom for each? These items constitute checks upon the validity of expenditures, and enable one to test their correctness, to prove a

was, however, aware of the propriety of annexing his certificate to his contingent accounts, and was willing to do so, if the committee required it. Col. Long rejoined, that fifteen years experience in the United States' Engineer service had taught him to view the subject very differently, and that his knowledge of the usages in the United States' Engineer Department, convinced him that accounts rendered in the manner of those submitted by the Superintendent on this occasion, would not be passed by that Department. He farther stated, that the truth in relation to this matter might be easily ascertained from the files of the Department alluded to, and he was willing to abide the result of an appeal of this nature.

The committee were of opinion that Col. Long's *education and pursuits* had no doubt induced him to be more particular in matters of this sort, than the welfare and interests of the Rail-road service required, and that in the present case, the rigid formality he wished to observe might be dispensed with. That the accounts of the Superintendent were sufficiently clear and explicit, and might safely be passed as authentic and valid. At a subsequent date, as will hereafter be shown, this committee pronounced the exactions of the President of the Board of Engineers, which were made with the view of introducing correctness and system in the keeping and rendering of accounts, "*onerous and unnecessarily expensive*," at the same time intimated their conviction that all the facts required by him, to substantiate the accounts, were virtually contained in the documents of which we have just been treating. *The accounts in question*, notwithstanding their defects and imperfections, *were approved and passed by the committee on accounts!!!*

faithful or abusive expenditure; to shew that objects authorised only have been paid for, and at prices agreed upon, and to protect the company against future claims for what the receipts and forms may shew, have already been liquidated. And yet forms, with such advantages, are considered useless to observe. Millions may be expended in this way, and the road unfinished, and no one know for what the expenditure has been made; but in the way proposed every dollar may be traced to its proper object, and the stockholders at any time informed of the application which has been made of their money.

This extraordinary measure, in reference to a subject affecting the disbursement of hundreds of thousands of dollars, may be regarded not only as giving a sanction to, but as effecting the consummation of misrule, in the fiscal transactions of the company in its most important, and costly concerns. Receipts for money paid, independently of any specific consideration for which it was paid, seemed now to be regarded as sufficient vouchers, to justify any expenditure the Superintendent might think proper to make. In one instance merely, an expenditure of $3,500 had certainly been made, wherein the consideration available to the company, was not more than one fourth that amount. Whether this is a solitary instance or not, actual measurements of the masonry constructed, and a correct statement of the amounts actually paid therefor, whenever such developements shall have been faithfully made, will afford the means of deciding.

By this measure, the power of controlling the Superintendent in the performance of his duties, and especially those that relate to the disbursement of funds, was wrested from the Board of Engineers, and the Superintendent was now, to all intents and purposes, invested with all the power and authority to which he laid claim in his forms for contracts. (See Docs. Q and R.) In fact he was now constituted sole manager, and umpire, in all matters relating to the position and construction of the road, and the disbursements for work done upon it.

So forcibly was Col. Long struck with the imprudence, and even absurdity of this measure, as also various other measures, adopted through the instrumentality of the Superintendent, and more particularly that of substituting stone, for wooden bridges, that he now unhesitatingly declared to Mr. Thomas, his conviction, that within six months from the date of which we have been speaking, the stock of the company, which was then selling at a premium of two to three dollars per share, would fall to one half its par value; and expressed his apprehension, that the measures adverted to, would have a tendency to involve the company in serious embarrassments, and might result in a total defeat of their enterprise.

We shall take this occasion to remark, that however "*onerous and unnecessarily expensive*" it might have been in the estimation of the committee on accounts, to cause the Superintendent to furnish statements of the quantity of masonry built, and stone delivered, *two of the members of that committee* were subsequently informed, that the quantity of masonry was uniformly estimated at least *once a month** from the commencement of the work, and that the Superintendent always made his payments in accordance with the estimates thus made and furnished by the agent of masonry!!!

Of grading on the third and city division.—On the 23d of March, 1829, instructions were furnished to the Superintendent, which were as follows, viz:

"Sir—In conformity to a resolution of the Board of Directors

*We would not by any means be understood as having a design to impugn the integrity of the committee alluded to, or to question their competency to investigate and decide upon the validity of accounts. They were Directors of the Company, and as such were bound by oath or affirmation, "well and truely to discharge the duties of their said office, to the best of their skill and judgment." No doubts are entertained that the testimony adduced, in relation to the several cases brought under their notice, was of a character to establish in their minds, the conviction that facts were precisely as they represented them.

We must, nevertheless, be indulged in the opinion, that the facts would have been far more clearly established, had the committee demanded of the Superintendent the returns of the measurements, &c. alleged to have been made monthly to that individual, by his assistants. At any rate, the fact that such returns had been made, as also their purport and character, need not have been inferred, from the unqualified assertion of a single individual, not only unsustained, but absolutely invalidated, both by the hesitating manner in which it was made, and the doubtful circumstances of the facts to which it related.

The examination of accounts, especially of such as are inadequate and defective, is a species of drudgery requiring much patient investigation, and ought certainly to be referred to those best acquainted with the objects to which they relate. This duty, agreeably to the regulations for the Engineer Department, (Doc. L.) belonged to the Board of Engineers, and might have been performed by them, but for the interference of the President of the Company, and through him, the assumption of the Directors, which have contributed, not only to frustrate the efforts made on the part of the Board of Engineers by their President, to "*secure a strict accountability in the fiscal operations of the company, and economy in the disbursement of its funds*, but have actually placed it beyond the power of the Directors, "*to exhibit a clear and distinct statement of the affairs of the company.*"

of the Baltimore and Ohio Rail-road Company, you are requested to make the necessary arrangement for grading the following portion of the third division of the Baltimore and Ohio Rail-road viz: beginning at the westerly termination of the second division, and proceeding thence on the line of the road as located by the engineers, cutting through the hill opposite to the confluence of north and west forks of the Patapsco, and extending across the valley or depression next beyond it.

"The manner of receiving proposals for the execution of this work, is confided to yourself. Prior to its execution, your are requested to report to this Board, the steps you may take in relation thereto, and to await their decision in reference to the steps thus taken."

The Superintendent took no notice of this communication. Proposals were received by him and the work was let, without the least intimation of the nature of the agreement, till many weeks after it had been concluded.

On the 13th of May, 1829, a definitive location having been made, under the direction of Col. Long, on a part of the route within the city of Baltimore, and the Directors having authorised the commencement of the work, the following instructions were furnished to the Superintendent for that purpose.

"Sir—In the absence of my colleague, Mr. Thomas of the Board of Engineers, I take the liberty to request, that you cause a portion of the Rail-road to be graded extending from the first stone into the city of Baltimore, so far that the excavated materials, on the line as located by Lieuts. Thompson and Barney, drawings of which are herewith presented, may form the embankment across Gwynn's run; the side slopes both of the cutting and filling, being in the ratio of one and a half to one." (The slopes of the cutting were subsequently altered to 45 degrees.)

"You are also requested to cause a bridge of suitable dimensions, to be constructed across Gwynn's run, the bridge to be of such form and construction as this Board may approve. Any farther information you may require, in reference to this part of the work, will be cheerfully rendered by this Board,

Signed, S. H. LONG, *President.*

These instructions shared a similar fate to those preceding them; no intelligence having been given in conformity to their requisitions.

Of the Report of the Board of Engineers, on several routes leading from the confluence of Parr's and Gillies' falls, to the Point of Rocks.

Great anxiety had been for some time manifested by the people of Frederick county, with respect to a choice between the several routes that had been surveyed, leading through their county. A correspondence had been for some time carried on between the President of the company, and certain gentlemen of a committee appointed by the citizens of Fredericktown, in which the latter pressed a decision in relation to this interesting question, while the former was disposed to evade it for the present.

At length the President of the company, requested the President of the Board of Engineers to prepare a report on the subject of the surveys alluded to, with all practicable despatch. This request was communicated early in May, and the report, drawings, and other documents, having been prepared with the utmost promptness, were submitted on the 13th of the same month. The report was subsequently *post-dated* at the request of Mr. Thomas, and purports to have been rendered on the 20th of May.

The report (See Appx. Doc. B. 2.) embraces a brief description of five routes, leading in different directions from the confluence of Parr's and Gillies' falls, in the valley of the Patapsco, to the Point of Rocks. The details upon which it is based, were exhibited in a report furnished by Lieut. Gwynn which presented the numerous results developed during the preceding season, by the surveys made by himself, and other officers on duty with him. The numerous drawings which were executed in the field, afforded the means of compiling a correct chart of the several routes, which was submitted as an accompaniment to the report. In this document, an attempt was made at an approximate estimate of the expense of grading and bridging on the several routes described, which estimate, for want of an adequate developement of the actual cost of construction on those parts of

the work now under *contract;* was predicated on the cost inferrible from the reputed contract prices, as in the first annual report of the Board of Engineers. The prices thus estimated, although they may not prove adequate to the accomplishment of the work proposed, may nevertheless be regarded as throwing additional light upon the comparative merits of the several routes. This report, and the drawings, explanatory of the several routes in *plan and profile,* were prepared in duplicate; one of which was intended for the Board of Directors, and the other for transmission to the Frederick committee.

Col. Long's reasons for remaining in the service of the Company.—We take the liberty in this place, to invite the attention of the reader to a subject of very little interest to him, probably, but of very considerable moment to one of us. An inquiry has no doubt repeatedly suggested itself, of the following import:—Why did not Col. Long resign his membership in the Board of Engineers, on finding himself so often baffled and disappointed in his views and expectations? The answer is briefly as follows: He was led to believe that his motives were duly appreciated by the Directors, who were said to be fully sensible of the important services he had rendered, and were not disposed to dispense with their continuance. That however different the views of individuals might be, all had the advancement and success of the great enterprise at heart. Differences had frequently arisen between him and a few others, but these would all be satisfactorily adjusted, on the return of the other members of the Board from England. On their return, the duties of all engaged in the service would be carefully defined; the Superintendent in particular, would be restrained within due bounds, or dismissed from the service of the company. He accordingly concluded to await patiently the return of the mission, and shape his course according to the circumstances that might then occur.

Return of Mr. Knight and Capt. McNeill from England.—The return of the gentlemen who had been deputed on the mission to England, took place on the 22d of May, 1828, and was greeted as a harbinger of peace and concord, by all parties, who

had hitherto been disappointed in their views, baffled in their purposes, or unsettled in their plans. Some were disposed to believe, that the policy now to be adopted, would be such as to establish a correct system in the management of the affairs of the company, and ensure a rigid observance of economy in the disbursement of funds, while others triumphed in the prospect of having their measures sanctioned, their purposes justified, and their pretensions confirmed.

Immediately on their return, the members of the Board travelled in company, along the line of the road, and from time to time expressed their opinions on the progress and condition of the work. It was apparent that Mr. Knight and Capt. McNeill, (both of whom had been absent on the mission) concurred in the opinions which had been repeatedly advanced by Col. Long, in reference to the style of masonry introduced into the bridges. They were both dissatisfied with the facings and other expensive finishings, which had been attempted merely as embellishments to the work, and regarded them as so many proofs of bad taste and want of judgment in their projector.*

In regard to the substitution of stone bridges and embankments for wooden structures, they of course acquiesced in the decision made by the Directors, but saw no reason for changing the opinions they had formerly expressed in reference to this subject. With respect to the Patapsco bridge, which was now being commenced, they were decidedly in favour of the rustic manner in

* The bridges built with dressed or faced stone, are as follows, viz: at Gwynn's falls, Roberts' run, Warfield's lane, Gadsby's run, D. A. Smith's field on the tenth section, Dorsey's run, a small bridge on the fifteenth section, another on the seventeenth section, another on the nineteenth section, &c., together with most of the bridges on the second division. It is worthy of remark, that, subsequently to a visit made by numerous Directors and Stockholders, on the Rail-road about the 1st of October, bridges that had been commenced with dressed stone, prior to that date, were completed in a most ungraceful manner, with rubble work of a very unsightly appearance. This change is supposed to have been occasioned in consequence of the general dissatisfaction expressed by the visitors, at the useless embellishments displayed on most of the bridges.

which it was proposed to be built, and regretted that the mason work of the other considerable bridges had not been executed in a similar manner.

With regard to the principles upon which the surveys and locations of the road had been made, and the plans of construction recommended by the Board of Engineers, the Rail-roads which they had seen in England, had contributed to strengthen their convictions of their propriety, and correctness. The dimensions of the road in particular, were such as they would now recommend.

Mr. Thomas resigns the appointment conferred, at his own request, on the 10th December, 1828.

On the 25th of May, 1829, the following notice was put into the hand of Col. Long, by Mr. Thomas, viz: "The immediate supervision of the operations in progress upon the first and second divisions of the Rail-road, having by an arrangement between us, been confided to me, during the absence of two of the members of the Board of Engineers in Europe, and those gentlemen having now returned, I avail myself of the earliest opportunity to withdraw from a farther separate attention to the duties committed to me in relation to this service."

The Board of Engineers having been convened, the President stated that in conformity to the arrangement above mentioned, Mr. Thomas had assumed and exercised the duties of supervising and directing the operations of the Superintendent of construction, and had continued to do so from the 10th December, 1828, to the present date; also that Mr. Thomas had this day resigned his separate agency as above, and that the duties heretofore performed by him, now reverted to the Board of Engineers.

It is worthy of a passing remark, that Mr. Thomas at this time, made a pressing demand on Col. Long to surrender all the papers containing the correspondence that had been carried on between Mr. Thomas and himself, and that Col. Long refused to comply with such a request.

Whatever might have been the motive that induced this singular demand, on the part of Mr. Thomas, Col. Long now felt him-

self confirmed in the suspicion he had for some time entertained, that Mr. Thomas was actuated by great hostility towards him.

We shall here venture to make a few observations on the peculiar kind of administration that prevailed during the period above mentioned. Mr. Thomas, overstepping the bounds of his appropriate station in the Board of Engineers, seemed to regard himself, as invested, not merely with the authority of a professional member of the Board, but with the absolute control of all matters cognizable by the Board, so far as they related to the operations of the Superintendent. No communications on the state and progress of the work, either written or verbal, were made by him to the Board of Engineers; nor had this body now any means of acquiring a knowledge of various important measures, originated and effectuated without a reference to the Board. Expensive stone viaducts across Gwynn's falls, Gadsby's run, Warfield's lane, Dorsey's run, the Patapsco, &c. &c. were to be planned and executed, and no intimation in regard to the time or manner of their construction, was furnished to the Board. Col. Long held himself in readiness to co-operate with Mr. Thomas in these delicate matters, and even offered to furnish plans and estimates for the guidance of the Superintendent, in the construction of bridges; but his counsel in cases of this sort, was neither acceptable nor desirable. No plans nor estimates were solicited, nor indeed were they deemed essential, since we had a *practical man* to superintend the business. All these, and various other bridges, were actually commenced without a plan. Although the Superintendent had procured a drawing board, which he thought large enough to contain plans of all the bridges on the first, and perhaps the second division, it was not embellished with any delineations of this sort. Notwithstanding he had talked largely upon the subject of filling his large board with plans of bridges, he actually deemed it useless to consume time in "*making pretty pictures.*" *He needed no instructions on the subject of bridge building, having been a practical superintendent of such structures* during a part of two years.

Most of the bridges on the first and second divisions were undertaken during the period adverted to. That at Gwynn's falls, was to be built for $21,500; that at Gadsby's run, for about $15,000; that at the Patapsco for $16,000. The gross inadequacy of these estimates will hereafter be made apparent, as also the absurdity of indulging a mere novice in the planning and direction of works of this description.

During this period also, cars, upon *temporary* railways were extensively introduced upon the line of the road, for the removal of earth. This device promised many advantages in facilitating and expediting the work upon the road, and would have answered them, had it been judiciously applied, and the rails and cars properly constructed. But owing to glaring defects in all these particulars, instead of reducing the expense of grading, the use of temporary railways and cars, has almost invariably contributed to enhance its cost.

Under this administration, and during a season when the inclemency of the weather was unusually severe, the *contractors* were encouraged to keep large forces in their employ, and to urge on their work with the utmost despatch. It was a leading feature in the policy of this period, to induce *contractors* to draw largely; not only on their means, but on their credit; with vague assurances, that they were in the employ of an honourable company, who would not permit them to suffer, nor withhold a liberable remuneration. Many of these were lured with the prospect of an ample reward for their exertions, till they at length found themselves involved in bankruptcy, and their families almost reduced to beggary or starvation.

CHAPTER VI.

Estimates on account of construction, surveys and contingencies.—No amendment of the Regulations deemed necessary.—Project of By-laws, opposed by Mr. Thomas.—Location within the city of Baltimore.—Col. Long's report thereon.—Progress of the work in conformity to contracts.—Committee appointed to ascertain the same.—No statements of contracts relating to masonry received from the Superintendent till July 1829.—Character of the returns rendered by him in that month.—Dimensions and mode of construction of certain bridges.—Carrollton viaduct; its cost &c.—Jackson bridge; its cost &c.—Patterson viaduct; its cost &c.—Wooden viaduct at Ellicott's mills; its estimated cost &c.—Bridge and embankment, at Gadsby's run; their cost &c.—Remarks on the deep cut.—On the city division.—Contract prices for grading and masonry.—Analysis of the latter.

Agreeably to the design intimated at the commencement of the preceding chapter, we shall continue the discussion of the subjects still before us, under their appropriate general heads, and shall confine our attention more particularly to the principal events that transpired from the date of the return of the deputation from England, to the close of the current Rail-road year, on the 30th September, 1829.

With respect to the description, purchase, and cost of materials for the construction of the road, including sleepers, rails, &c. &c., the progress and cost of the surveys, &c., made in reference to the location of the road, and various other items of in-

formation, we beg leave to refer the reader to the second annual report of the Board of Engineers, and its accompanying documents.

Of estimates on account of construction, &c.—Inasmuch as the returns of the Superintendent had not been sufficiently full and explicit, to show that the disbursements made by him had been applied in the manner and upon the objects authorised by the Board of Engineers, the President of this Board doubted the propriety of placing any more funds at his disposal, and had accordingly withheld his sanction to the estimate of the Superintendent, for the month of May 1829. At the first meeting of the full Board of Engineers, which took place on the 23d of the same month, the consideration of the estimate alluded to, was brought before this Board, and the following order taken in reference to it.

"Resolved, that the estimate of the Superintendent for the current month is incomplete, in so far as it does not exhibit a statement of the 'force employed' upon the road, agreeably to the form prescribed by this Board, Oct. 28, 1828. The exigencies of the service however, requiring the immediate appropriation of funds to the credit of the Superintendent, it was farther Resolved, that the estimate be passed, and that the President of the company be requested to cause the amount thereof, $30,000, to be placed to the credit of the Superintendent."

This resolution was introduced by Capt. McNeill, and was regarded as ominous of the course likely to be pursued by the Board of Engineers, in relation to the conduct of the Superintendent. It inflicted direct censure upon him for non-compliance with instructions that had been given him, by the Board of Engineers, in the absence of Mr. Knight and Capt. McNeill, who did not hesitate to signify their dissatisfaction at the repeated acts of disobedience, of which the Superintendent had been guilty.

The estimate was accordingly approved, and the amount of credits to the Superintendent was now raised to $210,000.

The monthly estimate for June, was the first return of this description which exhibited in its appropriate place (See Doc. D.

1.) a statement of the force employed. This estimate called for an appropriation of $80,000, which was approved, and this amount was at once placed to the credit of that officer, making the aggregate amount set to his credit $290,000.

On the 8th of July, 1829, no quarterly or monthly return of the work done, having as yet been rendered to this Board, another estimate for the current month was received from the Superintendent, calling for $70,000. This amount was also set to his credit, making the aggregate amount as yet unsatisfactorily accounted for, equal to $360,000.

A monthly estimate for August, calling for $60,000, and another for September requiring $65,000, also a third for October requiring $65,000, were received within those months respectively, and approved by order of the Board of Engineers. That for September had been laid before the Board of Directors, prior to its reception by the Board of Engineers, and made the basis of certain proceedings in that Board. The aggregate amount of funds thus entrusted to the Superintendent by the Board of Engineers, prior to Nov. 1, 1829, was $550,000.

It may be asked why this Board continued to augment their credits to the Superintendent, till they should amount to this enormous sum, while they were at the same time deeply sensible of the inadequate and unsatisfactory manner in which he had accounted for the sums expended? A solution to this question is only to be found by recurring to the following facts. A majority of the Board of Engineers, consisting of Messrs Thomas and Knight, had at an early date, virtually relinquished to the exclusive control and management of the Superintendent, the business of concluding contracts for the construction of the road, by refusing to prescribe or regulate the forms by which they, in some shape or other, should be recognised as parties to the contracts. (See Chap. II. p. 57.) The same majority, had virtually vested in the Superintendent all the powers and privileges claimed by him agreeably to the forms framed by himself, by allowing him "to make any arrangements that he might deem necessary to the execution of the duties assigned him," instead of prescribing the

nature and conditions of contracts. (Chap. 2. p. 57.) Mr. Thomas, although he had concurred with Col. Long, in prescribing the manner in which the Superintendent should account for the expenditure of funds, actually sustained the Superintendent, in direct violation of the instructions given by the Board of Engineers with a view to a satisfactory adjustment of his accounts.—(See Document X. 1.) The committee on accounts, appointed by the Directors from among themselves, actually approved and passed upon the accounts of the Superintendent, although they were not deemed sufficiently authenticated, to receive the sanction of the Board of Engineers, in consequence of their having been found "informal, defective, and not in accordance with the regulations of the Engineer Department." This procedure on the part of the committee, was reported by Mr. Thomas, and subsequently by the committee of investigation, who recommended the dissolution of the Board of Engineers, as having been approbated by the Board of Directors; and was of course to be regarded as a precedent, or rule, by which the sufficiency of all future accounts of the Superintendent was to be tested. It was in fact regarded by the Board of Engineers as a precedent by which they were in a very considerable degree to be regulated in any subsequent disposition they should make, not only of the accounts, but of the estimates furnished by the Superintendent, and was repeatedly urged by Mr. Thomas and other members of this Board, in justification of yielding their approval to returns of this nature.*

Subsequently to the first of November, however, the Board of Engineers declined giving their sanction to any more estimates furnished by the Superintendent, in consequence of erroneous statements which had been detected in his returns prior to that date. An estimate, containing inaccuracies of this description, was presented by the Superintendent early in that month,

* The Board of Engineers were thus virtually constrained to an approval of the estimates of the Superintendent, and a majority of this Board were disposed to yield their sanction, not merely from the urgency, but from the necessity of the case.

but was not approved, for the reason just mentioned. From this estimate, and a brief report made at the instance of Mr. Thomas, the President of the company, appended to the estimate furnished by the Superintendent, for September, before mentioned, it appeared that the amount that would be required on account of construction for the months of November and December, 1829, was at least $80,000, which would swell the amount of the credits of the Superintendent, to $630,000!!!

Special estimates, calling for funds for the construction of a tunnel, at the intersection of the Washington road and Rail-road, two miles from Baltimore, and subsequently for the construction of a wooden bridge at that place, which was deemed preferable to a tunnel, on account of quick-sands and springs of water, which were likely to retard the completion of the latter, and render it more expensive than had been anticipated, were submitted by Col. Long, on sundry occasions, approved by the Board, and their amount, viz: $4,005, was placed to the credit of that officer. This amount was satisfactorily accounted for in due time, under the following heads, viz:

Expense incurred in preparations for tunnel, centrings, &c. - - - - -	$583,13
Abutments and counter-arch, lime, dressing, &c. included, viz:	
395 perches of masonry, at less than $4,43½ cents per perch; the stone for which was transported from Jones' falls, 3½ miles,	1751,29
Wood and iron work of bridge, with double floor, exclusive of covering—extreme length of bridge, 110 feet 8 inches, -	1,145,62
Covering of ditto, all things included,	524,96
Total	$4,005,00

Numerous other special estimates for the purchase of materials, and various contingent expenditures in relation to the construction of the road, were approved at sundry times; a particu-

lar account of which, setting forth the reasons and nature of the several expenditures, would contribute to an unnecessary enlargement of this volume. The aggregate amount thus appropriated, including contingencies in the city of Baltimore, prior to the 1st of October, 1829, was about $6,000. The aggregate amount subsequently appropriated, on special estimates and for similar purposes, and especially for the laying of rails, prior to the dissolution of the Board of Engineers, is $9,554,20.

We shall conclude our remarks, under this head, with a brief recapitulation of appropriations sanctioned by the Board of Engineers, and made out of the funds of the Rail-road company, which is as follows:

Aggregate amount appropriated on estimates for surveys for the Baltimore and Ohio Rail-road, from January 1st, 1828 to December 31st, 1829, and during a period of two years, - - - - -	$13,278,34
Aggregate amount appropriated on estimates, for contingencies, in the city of Baltimore, for the same period, - - - -	4,901,64½
Aggregate amount appropriated on special estimates, &c. for various items of construction, purchase of materials, &c. *for same period*,	19,559,80
Aggregate amount appropriated on estimates for construction rendered by the Superintendent, from September 1st, 1828 to September 30th, 1829, - - - -	550,000,00
Total amount appropriated on Estimates, &c. approved by the Board of Engineers,	$587,739,68½

Of the revision and amendment of the regulations for the Engineer Department.

This subject had been repeatedly adverted to, as among the most prominent to which the attention of the Board of Engineers would be directed, on the return of the absent members of

this body. No serious defects had as yet been detected in the code adopted by the Directors; nor was it possible to discover any such defects, from the circumstance that they had never been tested, except in so far as they related to the surveys, &c. in respect to which they had proved appropriate and salutary. But with respect to their application in matters relating to the construction of the road, and especially to the operations over which the Superintendent presided, they had been so much disregarded and evaded, as to preclude the possibility of forming a correct judgment as to their impropriety or their utility.

On the 25th of May, 1829, a committee consisting of Mr. Knight and Capt. McNeill, was appointed for the purpose of revising the regulations of the Engineer Department, and were instructed "to report any amendments or alterations they might deem expedient, in order to secure the objects contemplated in their adoption, as signified in the preamble or titular heading of the printed regulations."

This committee, on the 27th of the same month, requested a postponement of the duty assigned them as above, for a limited time, and "recommended that, in the mean while, the regulations as they at present exist, continue to govern."

The committee in fact were not aware of the defects which had been so loudly complained of, nor were they able to discover any material amendments or alterations, of which the regulations were susceptible, and which would be likely to render them more conducive to the attainment of the objects for which they had been instituted. Accordingly no changes were proposed or made in the regulations, although the President of the Company, and some few of the Directors, and especially the Superintendent of construction, appeared to have entertained a thorough conviction that the regulations were objectionable on account of intrinsic defects. It is worthy of remark, that all the objections levelled against the regulations, related exclusively to the operations confided to the Superintendent. No difficulties occurred at any time, in applying them successfully and satisfactorily in other branches of the service. In fact, the only opposition to their in-

troduction, and the only complaints urged against them, were those raised by the Superintendent and others, who were disposed to receive their impressions from him, and to second his views.

On the supposition that the regulations were to remain in force, and under the conviction that they were entitled to far more respect and consideration than had hitherto been shown to them, the President of the Board of Engineers prepared and submitted a preamble and code of "by-laws" for the government of the Board of Engineers, which were by them amended and adopted, as published in connexion with the Second Annual Report of the Board of Engineers, pp. 88, 89, 90, 91. These by-laws were intended as a partial exposition of various leading requirements embraced in the regulations which had hitherto been either disregarded, or misunderstood and neglected. They related principally to the appointment of the officers of the Board, their duties, the meetings of the Board, a record of their proceedings, their intercourse with the Board of Directors, their instructions to the various officers and agents of the Engineer Department, accounts, estimates, &c. the appointment of subordinate officers and agents, the appointment of disbursing officers, and the manner of disbursing the funds placed in their hands, and to the adoption of forms of estimates, accounts, abstracts, returns of work done, contracts, &c.

Sept. 24, 1829.—On a careful examination and mature deliberation, the by-laws were amended and adopted by the Board of Engineers, and a copy of them was transmitted to the President of the company for the information of the Board of Directors.

Notwithstanding Mr. Thomas had repeatedly promised to use his influence in favour of the adoption of any regulations that were calculated to define the duties of the several officers and agents in the employ of the company, and especially those of the Superintendent, and had often said that he would concur in any measures, having for their object either the adjustment or prevention of collisions among them, he protested warmly

against the project of by-laws submitted by the President of this Board, and even refused to attend the meetings of the Board while they were under discussion.* The by-laws having been

* Col. Long now took occasion to expostulate with Mr. Thomas on the inconsistency and illiberality of such a course, especially when contrasted with the repeated assurances given by Mr. Thomas of his friendly co-operation in any measures, having for their object the adjustment of all disagreements subsisting between the agents of the company, and the prevention of similar misunderstandings, and the difficulties to which they might give rise, in the further prosecution of the work. Mr. Thomas admitted that he had been desirous of the accomplishment of the objects alluded to, and had expected that it would result from an amendment of the regulations, which, as it now appeared, were not deemed susceptible of any material improvements.

Mr. Thomas again adverted to the exigencies of the service: various reports, requiring much labour and careful attention, were now to be prepared: rails must be laid upon a part of the road: cars must be constructed, &c. &c. Moreover, he should object to the consideration of the by-laws, or any other measures, at this time, that were not immediately conducive to the accomplishment of these objects. Any new arrangements, in reference to the duties of the Superintendent, might lead to embarrassments calculated to impede the progress of the work, which must not be interrupted on any account. The measures contemplated in the by-laws, if passed, might induce the Superintendent to retire from the service of the company, and he would advise the Board of Engineers to beware of taking any steps that might have a tendency to deprive the company of his valuable services.

On the other hand, Col. Long observed, that the embarrassments, in which the affairs of the company were already involved, were of the most serious and alarming nature, and that any longer delay in the application of a remedy to counteract their evil tendency, would only serve to plunge the Board of Engineers, and all others concerned, more deeply into difficulties. A new Rail-road-year was about to commence, and Col. Long was exceedingly anxious that a better and safer system of administration should commence with it. The embarrassments apprehended by Mr. Thomas, were, in the opinion of Col. Long merely imaginary. He could not regard the services of the Superintendent so essential to the successful accomplishment of the work, as Mr Thomas seemed to think they were. There were now in the service of the company able and efficient officers, equally as well qualified to superintend the construction of the road, as Mr. Wever could be supposed to be. Moreover, the personal services of the professional members of the Board of Engineers, could, at any time, be put in requisition, in order to obviate any embarrass-

passed by the Board, Mr. Thomas signified his desire that the operation of the 11th article, which provides for a change in the manner of making disbursements out of the funds of the company, might be suspended until *the 1st January next!!*

"Whereupon it was, on motion, Resolved, that in deference to the opinion of the President of the company, this Board will concur in his request, unless otherwise directed by the President and Directors of the company."

A copy of this resolution, accompanied by a statement of the reasons that induced its adoption, was furnished to the President of the company for the information of the directors. Whether this or any other communication from the Board of Engineers, in reference to the by-laws, and indeed in reference to various other subjects, ever did reach the Board of Directors, has never been satisfactorily ascertained; at any rate the Board of Engineers were never honoured with a direct expression of the sentiments of that body on this and a great variety of other subjects in relation to which their opinions and directions had been solicited.

Of the location of the Rail-road within the city of Baltimore.—The various steps taken with a view to the selection of a route for the prolongation of the road into the city of Baltimore, prior to the period contemplated in this chapter, have already been sufficiently explained. The concluding operations in reference to this object, now claim our attention.

On the 25th of May, 1829, the President of the Rail-road Company made the following verbal communication to the Board of Engineers. "It was the desire of the Directors, that a location of the road extending eastwardly from the first stone to Bal-

ments that might result even from a suspension of the duties of that functionary.

Mr. Thomas, however, still persisted in his opposition to the introduction of any changes in the present mode of administering the affairs of the company, and warmly advocated its postponement, until the *1st of January next*, for reasons known probably to none but himself, and with a view, no doubt, to the accomplishment of a purpose which, as will hereafter be shown, was consummated shortly after that date.

timore street, be made as early as convenient, and that such location be so conducted as to pass the road to, or through the square ground situated between Pratt, Poppleton, and McHenry streets, and Amity alley, and that it was also the desire of the Directors, that the surveys be so conducted as at the same time to afford a view of the relative merits of said route, compared with any other which the localities in their opinion may recommend to the consideration of the Board."

The execution of the duties thus enjoined was, by a resolution of the Board of Engineers confided to Col. Long, who immediately resumed his investigations, in conformity to the new views thus presented, with respect to the parcel of ground designated in the above communication.

The lot, or square alluded to, was situated on a rising ground adjacent to Pratt street, denominated hickory hill, elevated nineteen feet above the established level of the Rail-road, and of course requiring a vast expense in excavating, in order to lay the square open, on a level corresponding to that of the road.

In addition to the routes surveyed, and made the subject of a report, under date of May 2, 1829, (See Doc. Z. 1.) experimental surveys were also made with care on four other routes, and the amounts of excavation and embankment on each of them computed in season to be reported on the first of June following, when Col. Long submitted a report thereon, which is copied in the appendix. (See Doc. C. 2.) This report was addressed to the Board of Engineers, and received their unqualified approbation. The President of the Company laid it before the Directors, and it was there made the subject of considerable discussion. According to a representation from Mr. Thomas, a certain paragraph contained in the report, was exceedingly obnoxious to a majority of the Directors, and this gentleman requested Col. Long to strike it out, and submit the report thus mutilated. Col. L. was decidedly opposed to such an alteration, observing that the paragraph in question involved a leading consideration, uniformly kept in view by the Board of Engineers, in all the measures they had taken in reference to the summary requisition of

the Directors, which enjoined such a location as would "accommodate the city as now improved." Col. Long moreover remarked, that the consideration adverted to, was the only one upon which a reasonable preference to the elevation adopted for the road (sixty-six feet above tide) in its passage into the city, could be grounded, and added that this consideration was absolutely essential to a justification of the decision made by the Board of Engineers, in relation to the manner of connecting the Rail-road with the city of Baltimore as recommended by them.

The obnoxious paragraph was as follows, viz:

"It should be observed that these routes, (the four routes already alluded to) were surveyed with a direct view to a passage across, or in the vicinity of a tract of ground conditionally offered as a donation to the Rail-road Company, and that the surveys were made with a *particular reference* to the accomplishment of one of the leading objects kept in view by the Board of Engineers, while engaged in investigating the principles upon which a location of the road should be made, in order to "*accommodate the city as now improved.*" The object adverted to, is the *passage of Lexington hill, by means of a tunnel.*" (See Doc. C. 2.)

Mr. Thomas informed Col. Long, that unless this paragraph were stricken from the report, the Directors would not accept it. Col. L. replied that he would not consent to the erasure. He had made the report to the Board of Engineers, and if a majority of this Board were in favour of the erasure, it was not in his power to prevent it, but as an individual he should oppose it.

A majority of the Board were in favour of the alteration, and a transcript was accordingly prepared, in which the objectionable paragraph was omitted.

Nothing had ever transpired previously to this event, calculated to produce an impression that other than ingenuous views had been entertained by any one who had been instrumental in bringing about a reconciliation to the plan of introducing the Rail-road into the city, as proposed by the Board of Engineers, in several communications to the Board of Directors; nor were there previously any doubts on the minds of the Engineers, that the over-

tures that had passed between the Board of Directors, and the City Council were not made in good faith, and with the honest intention of extending the Rail-road by the route proposed, to the eastern parts of the city, such having been the object uniformly kept in view in every report made by the Board of Engineers, touching the manner of introducing the Rail-road within the limits of the city.

With respect to the propriety of regarding the lot above designated, as a gratuity worthy of the consideration of the company, we would merely observe, that the cost of excavations required, in order to reduce it to a level with the Rail-road, and thus render it acceptable and useful to the company, amounted to at least $6000; for which sum it is believed a lot equally as large, and as conveniently situated, might have been purchased. The same amount would have been nearly sufficient to grade the road to Baltimore street; the location having been made with the view of equalizing the amounts of excavation and embankment, throughout the entire distance from the first stone to that street, agreeably to the arrangement stipulated between the Directors and the City Council.

The several routes surveyed as approximate locations, having been reported, (See Doc. C. 2.) the Board of Engineers signified their preference for that subsequently adopted by the Board of Directors, in the following language: "with respect to the comparative merits of these routes, we are decidedly of the opinion, that the preference ought to be given to route No. 9, as being more direct, less expensive and better calculated "to accommodate the city as now improved," than either of its competitors, as presented in this paper."

Of the location of the Rail-road from the forks of the Patapsco, to Chapel ridge.

It having been determined by the Board of Engineers that the surveys, &c. for the prolongation of the Rail-road from the forks of the Patapsco westward, required the agency of a single party only during the current season, such a party was accordingly organized, consisting of three assistant engineers, and as many

acting assistants, who were required to co-operate in effecting the various reconnoisances, surveys, demarkations, &c. requisite to a definitive location of the road, together with duplicate drawings, executed with the utmost precision, and computations exhibiting the quantities of excavation or embankment for every course surveyed, which were to be recorded on the drawings for every distance of a hundred feet surveyed. These duties occupied the party from an early date in June to the 11th December. The plan of operating, and the principles that governed in the location, were the same as explained in former instructions of the Board, in reference to similar services. For further particulars in relation to these surveys and locations, see Second Annual Report of the Board of Engineers, p. p. 19, 20 and 21.

Of the state of the work on the first and second divisions of the Rail-road, and its progress in conformity to contracts.

A communication having been received by the Board of Engineers from the Superintendent, under date of June 6, 1829, in which doubts were suggested as to the sufficiency of the stipulated prices, for the accomplishment of the grading on various parts of the first and second divisions, and in which it was proposed that measures should be taken with a view to an equitable increase of compensation, in cases where an extra allowance might be deemed necessary, the following order was taken thereon, under date of June 8th, by the Board of Engineers, viz:

"Resolved, that Capt. McNeill and Lieut. Whistler, one of the assistants of this Board, be a committee to inspect the first and second divisions of the Rail-road, and that they inquire into the nature and condition of the several contracts for grading and masonry on the road, the state of the work and its progress in conformity to contracts, and report thereon as early as practicable."

We have already had occasion to animadvert on the meagerness and defects of the returns of the Superintendent. As yet, the Board possessed no means of judging of the adequacy or inadequacy of contract prices, for they had yet to learn the nature and conditions of the contracts. The repeated calls made on the Superintendent had hitherto been totally disregarded. No informa-

tion had as yet been given, explanatory of the difficulties or facilities encountered on the different sections of the road. In the "*estimates* of graduation" submitted by the Superintendent, and heretofore specially considered, were here and there appended, under the head of remarks, a variety of indefinable phrases of the following import: "This contract will require an increase of price;" "more work than was expected;" "do. do. do.;" "estimate considered low;" "probably too low in price;" "will probably be abandoned;" and the like, which contained all the intelligence that had ever been communicated by the Superintendent, with respect to the "means applied, the manner and effect of the application, and every other circumstance worthy of observation, incident to the progress of the operations in which he was engaged." (See Appx. Doc. L. art. 5.) From statements thus defective and inconclusive, which the Superintendent often made without a personal inspection of the work, and even in some instances without ever having witnessed its progress, must the Board of Engineers, infer any opinions they might entertain with respect to the difficulties attendant upon the work, and the extent of the means required to overcome them.

The committee above mentioned at once engaged in the investigations contemplated, in the resolution authorising their appointment, and after a careful examination of every section of the first and second divisions of the road, submitted their report thereon under date of June 23d, 1829.

This report exhibited a clear and satisfactory exposition of the state and progress of the grading done upon the road at that time, and embraced the very items of intelligence, so often required of the Superintendent, and so obstinately withheld by him. The report has been published at full length as an appendage to the "Second Annual Report of the Board of Engineers," (p. p. 67 to 82) to which we beg leave to refer.

The inquiries of the committee were confined more particularly to the state of the *grading* upon the road; that of the masonry having been reserved for future investigations, the Super-

intendent not yet having arranged matters for a full disclosure of facts touching this branch of the service.

A copy of the report was now submitted to the directors, and the changes in the prices, and the manner of settling with contractors therein contemplated, were referred by the directors to the Board of Engineers and Superintendent, and the latter was directed to regulate his payments in conformity thereto.

In reference to the fourth section of the second division, we take this occasion to observe, that the Superintendent applied to the Board of Engineers for authority to change the location, (which is the only example on record, of any application of the kind ever having been made by him, although he had, in the absence of Mr. Knight and Capt. McNeill, in numberless instances, assumed the power of changing the location) and that the Board authorised the change proposed, on the representation of the Superintendent, that a saving of sixty-eight feet in distance would result from the contemplated change; that the position of the road, in other respects, would be preferable; and that the additional expense, likely to be incurred by the change, would be between five and six hundred dollars, (See Appendix Document D. 2.) The length of this section is 153½ poles. The original price for which it was to be graded, was $6,50 per pole: that fixed subsequently to the change was $12 per pole—making the difference in the cost, as occasioned by the change, $844, instead of between five and six hundred, as reported by the Superintendent.

With respect to the state and progress of the *masonry*, on the divisions above mentioned, the Board of Engineers still remained in the dark; all their efforts to obtain from the Superintendent a disclosure of the nature and conditions of the several contracts for masonry having hitherto proved abortive: nor had they been favoured with the least documentary light in reference to this branch of operations committed to his superintendence, till the 20th July, 1829, when a document which was completed on the 18th of the same month, and put into the hands of a member of the Board of Engineers on the same day, and which purported

to be "*An exhibit of the state of the masonry on the city, 1st, and 2d divisions of the Baltimore and Ohio Rail-road,*" on the 1st day of July, 1829, was received from the Superintendent, and regarded by the Board of Engineers as an authentic statement of contract prices, the amount and cost of masonry done, and that of the masonry remaining to be done; together with certain extra allowances beyond what had been recommended in the report of the committee just referred to, which *in the opinion of the Superintendent* ought to be made on certain parts of the work therein designated.

This return which was the first ever submitted by the Superintendent, from which the quantity of work done or the contract prices of the same could be inferred, represented the amount paid on account of mason-work, prior to the 1st July, to be $78,628,64. And the amount required to complete the masonry on the several parts of the road above specified, inclusive of extra allowances, to be $127,612,24, making the aggregate cost of masonry on the city, 1st, and 2d divisions, $206,240,88, inclusive of extra allowances, amounting to $17,616. We would here observe that, although this amount was then deemed sufficient to *complete* the masonry on those parts of the road alluded to, yet we aver, without the fear of contradiction, that the cost of the masonry on the city division, and on the 1st, 7th, 10th, 15th, 17th, 19th and 21st sections of the 1st division, has actually amounted to a greater sum than that just stated; and we do not hesitate to affirm, with equal assurance, that no changes materially affecting the cost of the masonry, were ever made in the mode of construction, or in the extent of the several bridges, subsequently to the date at which the Superintendent's return under consideration was made out and presented, although strenuous efforts were used to establish the reverse of this position before a certain committee of investigation.*

* The success attendant on these efforts is exemplified in the report of this committee, which is exhibited in the sequel of this narrative.

This "exhibit of the state of masonry" contained statements purporting to be *contract* prices, some of which differed materially with those known to have been agreed upon at the commencement of the work, and many of them were subsequently found to be utterly false. For examples, the contract price for building the bridge across Gwynn's falls covering the expense of facing all the walls with dressed stone, in the best manner, agreeably to orders previously given, in conformity to instructions from the Superintendent,* was stated at $21,500. The contract price for masonry on the city division, all things included, was stated at $4 per perch. The contract price for the arch-work of the Gadsby's run bridge, was stated at $10 per perch. The contract price of the Patapsco bridge, was stated at $20,000. These statements were all untrue, as appeared from subsequent inquiries, to which we shall again advert in their proper place.

The return just considered, was accompanied by another, entitled an "Exhibit of the number and length of the sections, and the *state of the contracts* for the graduation of the city division, and of the 1st and 2d divisions without the city, of the Baltimore and Ohio Rail-road, and the amounts which may yet be necessary to complete these *contracts*."

Both of these returns purported to exhibit, for each section of the road, the total amount of the work to be done, at the commencement of the work, the amount done at the date of the returns, and the amount remaining to be done subsequently to that date: also, the contract prices at which the work was to be done, the amounts paid, and the amounts necessary to complete the work on each contract.

Strange and absurd as it may seem, in view of returns thus designated, and especially of the details contained in them, efforts were made before the committee, above alluded to, to show that these documents were to be regarded merely as *estimates*, and not as returns or reports of contract prices!!

* It should be borne in mind, that the dimensions of this bridge were fixed upon prior to June 20th, 1829, and were to be such as would admit of two *arches of eighty* and twenty feet span respectively.

Agreeably to the return last mentioned, the amount expended on account of grading, prior to July 1st, 1828, was $200,115, and the amount required to complete the grading on the city, 1st, and 2d divisions of the road, inclusive of extra allowances, amounting to $25,251,24, was $202,825,24, making the aggregate amount, required to complete the grading on those parts of the road, $402,940,24.

In regard to the extra allowances, the amount of which, as exhibited in the two documents under consideration, is $42,867 24, it is not known for what reasons, nor by what authority, they were made. To justify the expenditure of this large amount, the Board of Engineers have nothing to show, from any documents furnished by the Superintendent, but the vague heading of the column of the returns in which it is included, consisting of the phrase "probable extra allowance," without a single explanation, showing the reasonableness or propriety of the allowance.

On comparing the prices exhibited in the return of grading, above considered, with those contained in the schedule of prices recommended by Capt. McNeill and Lieut. Whistler, the committee appointed to inspect the 1st and 2d divisions of the Rail-road, of which notice has already been taken, and approved by the Board of Engineers, various discrepancies are apparent, which at least contribute to show how little the decisions of the Board were regarded by the Superintendent. For examples, on one section $16 per pole was paid, when $15 only had been authorised: on three sections $35 per pole was paid, when only $34 was authorised: on another section $60 per pole was paid, when $55 had been authorised: on another $14 per pole was paid, when $4 was authorised: on another $85 was paid, when $18 was authorised: on another $40 was paid, when $36 was authorised, &c. &c. Although the prides thus paid were neither in accordance with former returns of the Superintendent, nor with the prices fixed agreeably to the sanction of the Board of Engineers, yet they were not to be regarded as affording the

least evidence* of his having *knowingly made false returns*, although the reasons of the discrepancies were never explained. With respect to the deep cut, it also appears that payments were made independently of any authority from this Board, at the rate of thirty-three and a third cents per cubic yard, instead of eighteen cents, which was the original contract price; no report on the state of the work at this place having been made until the 26th June, although required "*at an early date*," by a resolution of the Board, passed December 6th, 1828, (See Appendix Document Q. 1.)

The returns of which we have been treating, were unattended by any vouchers, attesting in the least degree, their authenticity. Nevertheless, the Board of Engineers, relying on the accuracy of the statements contained in them, framed a report at the solicitation of the President of the company, immediately on their reception; in which they communicated their views as to the probable cost of the Rail-road from Pratt street to the forks of the Patapsco, and the maximum cost thence to the Point of Rocks, as deduced from these returns. The report thus prepared was submitted to the Board of Directors, and published through the medium of the newspapers, before an opportunity had been presented of ascertaining the correctness of the data upon which it had been predicated. After some time it was ascertained that the report alluded to, contained incorrect statements, calculated to mislead the public, with respect to the actual cost of the work, and especially of that on the first division of the road. On further inquiry, it appeared that the erroneous impressions received and promulgated by the Board of Engineers, were attributable to a variety of incorrect statements contained in the returns above mentioned, and more particularly in the "exhibit of the state of masonry" on the first division. It had never, until now, been supposed that the Superintendent would knowingly make false returns, but recent discoveries seem-

* See the report of the committee of investigation, in a subsequent part of this narrative.

ed to place his conduct, in this respect, in a light too strong to admit any longer of a doubt that such might be the fact. At any rate, it was no longer deemed safe to confide in the summary or wholesale returns of the Superintendent, unsupported by vouchers establishing the authenticity of the statements they contained.

On the 31st of August, 1829, the Superintendent was "requested to furnish to this Board a statement, setting forth the contents, in perches of twenty-five cubic feet each, and cost per perch of the several bridges and culverts that had been constructed on the 1st and 2d divisions of the Rail-road, and on the city division of the same." And on the 16th September he was also required to furnish a similar statement, setting forth the quantity, rate and cost of grading done on the several sections of the road that had been put under contract.

Returns of a similar character to those before furnished by the Superintendent, and exhibiting discrepancies equally as glaring, on a comparision with former statements made by him, as those heretofore noticed, were submitted in season to be employed by this Board in framing their second Annual Report. From these returns, and other data obtained by the Board of Engineers, the following conclusion was drawn, as stated in the report above mentioned. (p. 30.) "It appears that on the first division about four-fifths of the grading, and three-fifths of the masonry have been executed; that on the second division about three-fifths of the grading and three-fifths of the masonry, and on the city division ninety-four hundredths of the grading, and all of the masonry have been executed. Also that the aggregate cost of the work already done on the road, is about $475,000, and that the probable cost of the grading and masonry still to be done on the divisions above mentioned is $232,081,70," making the aggregate probable cost of the grading and masonry, on those divisions $707,081,70. Notwithstanding all the extra allowances proposed by the Superintendent had been included in the above estimate, together with various other allowances, which were presumed to be sufficiently liberal to cover all the errors that could

upon the loosest calculation be supposed to have an existence in the returns of the Superintendent, yet it was discovered not long after the date of the report alluded to, that the bridge across Gwynn's falls was likely to cost $68,000, instead of $40,000 which had been assumed as the maximum cost in that report; that various items of masonry were likely to cost $15 per perch instead of $10, as reported; and that the Patapsco bridge might cost the company more than $40,000, instead of between $30,000 and $35,000 as reported, making a difference of $30,000 to $40,000, in three items only. These facts were reported to the Directors immediately on their having been discovered.

For farther information, as to the progress of the work, we beg leave to refer to the report above mentioned, and to an extract of a letter addressed by Col. Long to the President of the Company, in reply to a communication from the governor of Massachusetts. (See Appx. Doc. E. 2.)

Of the dimensions, plans, and construction of certain bridges, &c.—It has already been stated in the former part of this narrative, that the planning and construction of all stone bridges, of spans not exceeding twenty feet, were, by a majority of the Board of Engineers, confided to the Superintendent, with certain restrictions as to the slopes of walls, &c. all of which restrictions were evaded. The right to locate such bridges, and fix their dimensions, as he might think proper, was assumed by the Superintendent. In several instances the location and dimensions specially recommended and designated by a member of the Board, were changed by the Superintendent. On all occasions this functionary insisted on the privilege of taking exclusive charge of the location, planning and construction of all bridges of a size not exceeding twenty feet span, *independently* of any directions from the Board of Engineers, and was sustained in this purpose by the President of the Company, who invariably opposed any assumption on the part of the Board of Engineers, of the right or privilege of dictating plans or modes of constructions for the bridges that were to be built by the Superintendent. It is obvious from such a state of things, that any efforts, (and such efforts were re-

peatedly made) to introduce a more economical mode of construction than that pursued by the Superintendent, must prove, as they ever have proved, totally unavailing.

The only bridges hitherto required on the road with spans exceeding twenty feet, at any rate the only bridges of a greater extent authorised by the Board of Engineers, are the following, viz: A bridge of stone at Gwynn's falls, a wooden bridge at the crossing of the Washington road, on the second section, a stone bridge at the crossing of the Patapsco, and a wooden bridge at Ellicott's mills, of which we shall treat separately, in the order above given.

First of the Gwynn's falls bridge, or Carrollton viaduct.—The orders taken by the Boards of Directors and Engineers, in relation to this work, have already been a subject for discussion under date of December 4th, 1828, (See p. 98,) and in certain documents exhibited in the appendix. (See Doc. N. 1, O. 1.) Nothing more was done by the Board of Engineers affecting the construction of this bridge, till April 16th, 1829, when a communication was received from the Superintendent, in answer to instructions furnished under date of December 4th, 1828, (See Doc. O.) explanatory of his views in reference to the dimensions and position of the bridge, when it was agreed that a stone bridge comprising a single arch of fifty feet span, to be located in such a manner that the eastern abutment should stand at the margin, and the western within the area of Mr. Carroll's mill pond, should be constructed. The gentleman just named was not altogether satisfied with this arrangement, and, in the month of April 1829, engaged in a correspondence with the President and Directors of the Company, with the view of having provisions made for enlarging the water way, and for the construction of an additional arch for a road way on the westerly side of the stream.

This correspondence led to the immediate appointment of a committee on the part of the Directors, who it appears were charged with the making of definitive arrangements with Mr. Carroll; agreeably to which, the dimensions, position and other circumstances in relation to the bridge were conclusively settled.

This committee, by a written communication dated on the 20th June, 1829, apprised Mr. Carroll of their final decision in reference to the dimensions of the main and road arches, and their position. The Board of Engineers were kept in ignorance of any decision touching the dimensions, &c. of this structure till some time in the month of July following, when it appeared that a bridge of two arches, viz: one of eighty feet and another of twenty feet span, had been recommended by the committee and adopted by the Directors.

At the date of the return of the mission from England (May 22, 1829,) there had not been a single stone laid on the bridge, except in the bottom of the foundation of the eastern abutment, nor was it known that any plan of construction had been prepared for it, nor indeed could such a plan have been prepared for that purpose prior to that date, inasmuch as no final decision as to the dimensions of the work had been made till about a month thereafter, viz: on the 20th of June.

On the 18th day of August, the Board of Engineers having never been officially apprised of any authority given to the Superintendent, justifying a departure from the instructions of April 16th, (before alluded to) passed a resolution requiring "that the Superintendent be directed to communicate his reasons for deviating from the plan approved by this Board, in reference to the Gwynn's falls bridge, and that he furnish as soon as practicable, plans and specifications of all the bridges now in progress of construction on the Rail-road."

Mr. Wever's reply was dated on the 21st of the same month, and received on the 31st, in which he observes "in answer to this demand of the Board of Engineers, I can only state that I understood, that owing to the objections urged by Mr. James Carroll, the proprietor of the site, to any other plan than the one now in progress of execution, *the Board of Directors determined that just such a one should be made.*" "I have received no written instructions from the Board of Engineers to vary the plan at first adopted."

From a communication addressed to James Carroll, by a member of the committee before mentioned, and Mr. Carroll's answer thereto, it appears that the width of the water way or the span of the main arch was fixed at eigthy feet, on or about the 29th of April, 1829, and that the committee had given orders to the Superintendent for the construction of an arched road-way twenty feet wide, prior to the 20th of June following, at which time it must have been that the Board of Directors or their committee, not only determined that *just such a bridge should be made*, but *directed the Superintendent to make it*, although this officer seems to be at a loss to show whence he derived his authority for constructing such a bridge. Thus it is manifest that a *bridge of just such dimensions* as that in the progress of construction on the 21st of August, 1829, was determined on at least as early as the 20th of June preceding, and it is known that the Superintendent, prior to the date last mentioned, i. e. June 20th, had, upon his own responsibility and without the knowledge or sanction of the Board of Engineers, directed that "all the walls of this bridge should be faced in the best manner with cut or dressed stone." Notwithstanding these undeniable facts, attempts were made before the committee of investigation heretofore noticed, with singular success as will hereafter appear, to prove that changes in the dimensions of this bridge and in its mode of construction were authorized by the Directors subsequently to the 1st of July, 1829; it is nevertheless true that no such changes were authorised by that body, nor by the Board of Engineers, except in so far as related to the *position* of the arched road-way, which was required to be located a little lower in the abutment than the Superintendent seems at first to have contemplated.

On the 13th of July, an interview was held at the session room of the Directors, at which the committee above mentioned, Mr. Carroll, Mr. Thomas, Mr. Knight and Capt. McNeill were present. Col. Long had been invited to attend; but urgent business requiring his presence elsewhere, he remained but a few moments. The only subject proposed for consideration was the position of the road arch-way; its dimensions having been

previously agreed upon, as it was then expressly understood. The Superintendent had given it as his opinion that if the road-way was located at the base of the hill, as Mr. Carroll wished to have it, the cost of construction might be enhanced some three or four thousand dollars. The opinions of the Engineers were not in accordance with those of the Superintendent. They were not aware that any material difference in the cost of the work was likely to result from giving to the twenty foot road-way the position to which Mr. Carroll entertained a preference, and it was accordingly agreed that the road-way should be located at the foot of the hill.

Thus it is apparent that no delineations illustrative of the dimensions adopted in reference to this bridge could have been prepared by the Board of Engineers, prior to the 20th of June, and that the manner of its construction was not considered by the directors as finally settled until the 13th of July, at which time the foundation of both abutments of the main arch were laid; the centrings in a state of preparation, and a large proportion of the abutments and arch-stones dressed; no communication prior to the date last mentioned, having been made to the Board either by the President of the company, the committee, or the Superintendent, from which the dimensions agreed upon and adopted by the directors could be inferred. Nor had the Superintendent applied to the Board of Engineers for any instructions relative to the manner proper to be observed in the construction of the bridge, although he had repeatedly solicited counsel from other sources.

We shall conclude our remarks under this head, with a summary exposition of the estimated cost of this structure, as gathered from a variety of documents submitted to the Board of Engineers, together with the approximate actual cost, as inferred from the most authentic statements to which we have had access; to which will be added a statement setting forth the amount for which a substantial work of the same size might have been constructed, as also that of a wooden bridge as a substitute therefor

Original cost, as estimated by the Superintendent, and upon which a stone structure was authorised by the directors, - $12,000 to 16,000

Original price at which the bridge was to be built, as per verbal agreement with Mr. Lloyd: the bridge to have one arch of 50 feet chord, arch-stone to be procured from Port Deposit, 14,500

Price agreed upon by Mr. Lloyd, at which a bridge of the size last mentioned, with abutments of faced stone, from Port Deposit, should be built, - - - 16,000 or 16,500

A bridge of two arches, respectively, of 80 and 12 feet chords, abutments, and arch-stone of larger arch, to be of dressed stone, and the residue of rough stone, - - - 21,500

A bridge, having all of its walls, abutments, &c. faced with dressed stones, and comprising two arches, respectively, of 80 and 20 feet chords, as reported by the Superintendent, an extra allowance of $6,500, included, - - 28,000

Minimum cost of same bridge, as reported in the Second Annual Report of the Board of Engineers, - - - - 40,000

Cost of same bridge, as exhibited in a supplementary report of the Board of Engineers, 68,000

Actual cost of Carrollton viaduct, as deduced from statements relied on as authentic, - 76,000

which is equivalent to an average cost of about $7 per perch on the entire mason-work of the bridge.

Cost of a bridge, of equal size, substantially built with arches and facings of brick, - 37,555

which is equivalent to an average cost of about $3,50 per perch.

Cost of a wooden bridge, of the same length, viz: 300 feet, all things included, - - 4,500

Of the Washington road, or Jackson bridge, on the 2d section of the 1st division of the road.

The reasons that induced a wooden structure at this place, instead of a tunnel, have already been stated. We shall merely observe, that the Board of Engineers required of Col. Long estimates of the cost of a tunnel, together with drawings illustrative of its dimensions and manner of its construction, which were prepared under his direction, submitted in due form, and received the approbation both of the directors and the Board of Engineers. The same officer was subsequently required to furnish a plan and estimate of the wooden structure, intended as a substitute for the tunnel, which was accordingly done to the satisfaction of all concerned.

The manner of supporting the wooden bridge, and protecting the sides of the cutting beneath it, received the express sanction of the Board of Engineers, who had been specially requested to examine the site, and to decide upon the steps proper to be taken, in order to give permanency and stability to the foundation of the structure. In connexion with the method devised on this occasion, it was contemplated to form a counter arch of stone, which has been introduced in the manner then proposed, and has hitherto afforded an unyielding support to the banks of the cut at that place, and to the abutments of the bridge, which are located on the slopes of the banks.

The entire length of the Washington road bridge is 110 feet 8 inches; its width, in the clear, is 18 feet; and its height or length of post is 15 feet 8 inches. Its cost, exclusive of abutments, counter-arch, &c.* was as follows:

Cost of bridge, exclusive of exterior covering, but inclusive of all materials, smith's, carpenter's, and attendants labour, - - -	$1,145
Cost of covering, all things included, -	525
Total cost of wooden structure,	$1,670

* The average cost of the masonry connected with this bridge, inclusive of quarry leave, transportation to a distance of more than three miles, turnpike *at two gates*, mortar, dressing, &c. was about $4,43 per perch.

With respect to the efficiency of this bridge, pains have been taken to circulate rumours, injuriously affecting not only the character of the bridge, but the reputation of its projector as an Engineer. The baseless nature of these rumours, and the malevolent purpose of those who were instrumental in their propagation and circulation, may be inferred from the fact that the structure has, as yet, exhibited no symptoms of its being in any respect inadequate to the purposes for which it was intended. For the authenticity of which we beg leave to refer to statements (See Appendix Document F. 2.) kindly furnished by several competent judges who have lately inspected the bridge, and borne testimony to its stability and efficiency.

Of the Patapsco bridge, or Patterson viaduct.

The order taken in reference to this structure has already been noticed, under date of November 17th, 1828, (see p. 89, &c.) and the instructions based thereon have also been referred to, as exhibited in the Appendix, (See Document K.) The extraordinary partiality manifested by the Superintendent towards its builder, (John McCartney,) has also been a subject for animadversion, while we were treating of the returns made by the Superintendent, with respect to payments made on account of masonry, in chapter V, page 134, of this narrative.

It now remains to show the progress and cost of that work, and the manner of its execution, so far as we have the means of doing so, up to the date of its approximate completion.

It should be recollected moreover, that as soon as the Board of Engineers had decided on the dimensions of this structure, as explained under date of Nov. 17, 1828, Col. Long immediately engaged in devising a plan, and causing delineations to be made, in conformity to those dimensions, but that he was induced to desist from this purpose in consequence of his not being sustained in it by the Board of Engineers, then consisting of Mr. Thomas and Colonel Long. The President of the company was apprehensive that the Superintendent might take umbrage at such a course, and was from the beginning disposed to indulge him in the privilege of "planing his own bridges." It

is not known to us whether Mr. Thomas doubted the ability of Col. Long as a bridge architect, but it is certain he never solicited the counsel of the latter in the planing of this or any other stone bridge, that was in progress of construction, during the time when the former continued in the supervision of the operations of the Superintendent.

Mr. Thomas was apprehensive that the position selected by the Superintendent for the bridge, (which was materially different from that selected by the Board of Engineers) was not the best for that purpose, and did request Col. Long to consult *amicably* with the Superintendent and fix upon a more appropriate site for the bridge. Col. Long complied with the request of Mr. Thomas, and succeeded in the measure contemplated, although at the expense of being instrumental in defeating one of the measures particularly insisted on, in the instructions furnished by the Board of Engineers, under date of Nov. 17th. (See Doc. K. 1.) With regard to the planning of this bridge, Col. Long was never consulted either by Mr. Thomas or Mr. Wever. The latter, at the time when Col. Long was co-operating with him in establishing a site for the bridge, intimated his intention to provide for an arched road-way on each side of the stream leading through the abutments of the bridge. Col. Long was opposed to this measure, and alleged that the roads for which such a provision was contemplated, could cross the surface of the Rail-road on a level with the latter at far less expense, and at an elevation not greater than that over which they now had to pass. In fact, he saw not the necessity or even the propriety of incurring the expense of two arched road-ways, since a much more favorable passage across the surface of the Rail-road might be obtained than that afforded in their present situation, and at an expense incomparably less than that occasioned by arches through the abutments. He was however determined to effect if possible, an amicable settlement of the contested question relating to the position of the bridge, and merely observed, in reference to this subject, that if the arched road-ways were introduced, the main arches of the bridge need not have a span greather than fifty feet each, inasmuch as the side arches would afford sufficient vent

for all the water occasionally brought down in extraordinary freshets. This conversation, and the final settlement of the question relative to the site of the bridge, took place about the middle of April, sometime prior to the actual commencement of the bridge. The Superintendent signified no desire of having a plan furnished him; on the contrary, he had a plan of his own devising, which he intended to adopt without consulting the opinions of the Board of Engineers, as the event has proved.

On the 22d of May, the gentlemen of the mission having returned from England, and being then on a visit to the site of this bridge, which was now just commenced, a member of the Board of Engineers requested the builder to produce the plan of the bridge which had been furnished for his guidance in its construction. He produced a very rough and unsightly draft of the western abutment, which he stated was the only drawing he had been furnished with, and by which he was then laying the foundation of the abutment. He was further questioned as to the instructions he had received from the Superintendent, and replied that a bridge of four arches, viz: two of fifty-five feet span each, and two of twenty feet span each were to be built.

With the exception of occasional visits to this work, on the part of the members of the Board of Engineers, and occasional expressions of their opinions, with respect to the manner and progress of its construction, nothing worthy of remark was done by the Board of Engineers, till it was discovered from the returns of the Superintendent and from other sources, that the fiscal transactions relating to the Pataspco bridge, were not as they should be, and it began to be apprehended that peculations might have been committed upon the funds of the company, inasmuch as the official statements relating to this work had been confused and unsatisfactory from the beginning, and it was believed that the amounts paid for its construction had uniformly been far greater than those actually due.

On the 19th of October, 1829, the builder had been paid to an amount exceeding the reported contract price, although it appeared by a return from the Superintendent, of the same

date, that considerably less than one half of the stone had as yet been laid in the bridge.

On the 27th of October, 1829, the Board of Engineers required of the Superintendent a "disclosure of the authority agreeably to which provision was made for the erection of two common road-arches and road-ways, included in the bridge now constructing across the Patapsco," in relation to which it did not appear that any instructions had ever been given by this Board, differing from those dated on the 17th Nov. 1828, (See Appx. Doc. K. 1.) which required a bridge with two arches of fifty-five feet span, nor did it appear that the Superintendent had ever consulted the Board of Engineers in reference to the mode of construction he had adopted, or obtained any authority whatever for its adoption.

On the 30th of October, 1829, the Superintendent replied to the call above intimated, (See Appx. Doc. G. 2.) and informed the Board of Engineers, that "he did not now distinctly recollect whether those road-arches and road-ways were constructed solely by his own authority, or whether they were sanctioned by Col. Long and Mr. Thomas," but thought it most likely that they were sanctioned by the latter and not by the former, inasmuch as he "received his principal instructions from Mr. Thomas from Nov. 1828, to May 1829.

The fact is that the Board of Engineers never authorised or sanctioned their introduction into the bridge, nor was it ever surmised or contemplated till after their adoption by the Superintendent that he would presume to lavish the funds of the company upon objects totally unauthorised by those from whom, agreeably to the regulations he was to "*receive all his* instructions."*

With respect to the style in which the work of the Patapsco bridge has been executed, it has always met the approbation of

* An enumeration of the great variety of instances, in which the funds of the company have been expended by the Superintendent on objects unauthorised by the Board of Engineers, would prove a very laborious and difficult task; while an accurate estimate of the sums lavished upon such objects would swell the catalogue of abuses to an enormous length.

the Board of Engineers. A similar style had repeatedly been recommended by the President of this Board, but was never adopted in the construction of any other bridge, owing to the objections raised against it by the Superintendent. Nor could this individual be prevailed on in the present instance to waive his objections, till the builder, John McCartney, took the trouble to erect a wall at the quarry, in which the expense and appearance of the *rustic work* was contrasted with that of *dressed* or *faced work*, obviously to the disadvantage of the latter. Thus the style of the architecture displayed in this bridge is ascribable to the builder rather than to the Superintendent.

The Patterson viaduct when completed, will probably have cost the Rail-road company about $35,000. The aggregate quantity of masonry contained in it, exclusive of filling, has been stated at 6,655 perches, which at the amount just mentioned would give for the average cost of the masonry about $5,25 per perch. The real cost of this structure will unquestionably have been far less, as we shall now attempt to show.

The stone of which the bridge is constructed, is of a superior quality, and was found in profusion remarkably convenient to the work. The greater part of it was conveyed to the bridge site by means of temporary rail-ways and cars, constructed at the expense of the company. The exterior of the walls was dressed in a manner so rustic, and the sides and edges of the arch stones in a manner so rough, that those parts of the work could not fairly be admitted to have cost more than $6 per perch inclusive of all expenses. The *backings* and *fillings* of the bridge were composed of stone, excavated from the road in the immediate vicinity of the bridge, or from other places contiguous thereto, and cannot be said to have cost more than $1,25 per perch, for which price a side wall in the vicinity of Ellicott's mills, which was certainly as expensive as that portion of the work alluded to, is known to have been built. We are persuaded that any competent judge of mason work, on examining the character and circumstances of the work in question, would pro-

nounce the rates above stated extravagant, rather than inadequate.

Agreeably to a return furnished by the Superintendent, the aggregate quantity of dressed masonry contained in the bridge when completed, is 2,587 perches, which at $6 per perch amounts to - - - $15,522

Agreeably to the same return, the amount of *backing* and *filling* contained in the bridge, is 6968 perches, which at $1,25 per perch, amounts to - - $8,710

Maximum real cost of bridge - - - - $24,232

Leaving a net profit of more than ten thousand dollars in the possession of those concerned in the building of the bridge.

No doubts are entertained that a bridge of the size authorised by the Board of Engineers, containing two arches of fifty-five feet span each, might have been built for $16,000.

Of the contemplated wooden bridge, or viaduct at Ellicott's mills.

A structure of this description has been recommended by the Board of Engineers, as a means of crossing the Frederick road, and a plan and estimate showing the manner of construction, and approximate cost of the same has been prepared and submitted by Col. Long, in conformity to a resolution of this Board. The length of the contemplated bridge is 150 feet, and its width about 30 feet, including two road-ways.

The estimated cost of the wood work, inclusive of all materials, amounts to - - - - - $1,902,40

The estimated maximum cost of abutments and piers containing 1179 perches of rubble masonry, facings included, at $3,50 per perch, amounts to 4,126,50

Maximum cost - - - - - - - 6,028,90

Probable cost if built with rough masonry, about 3,100

Remarks on the Gadsby's run, bridge and embankment.—The grillage or wooden foundation for the support of the abutments of Gadsby's run bridge, agreeably to statements from the Superintendent, contained 370 perches of timber, estimated at $5,55½

per perch - - - - - - - - -	$2,000,00
Arch work, containing 563 perches at $16 -	7,400,00
Rubble work, containing 4725 perches at $5 -	23,625,00
Amounting to - - - - -	$33,033,00
To this amount must be added the sums paid to Jacob Councilman, on account of stone delivered for the construction of this bridge, say 3,200 perches at $2,25 per perch - - - - -	$7,200,00
Embankments across the valley of Gadsby's run 1000 feet long, and containing 171,839 cubic yards, estimated at 30 cents per yard - -	51,551,70
Aggregate cost of embankment and stone bridge*	$91,784,70
Maximum cost of a wooden viaduct 1000 feet long, which might have been substituted therefor as originally authorised by the Board of Engineers	15,000
Difference in favor of a wooden viaduct - -	76,784,70

Remarks on the deep cut.—Agreeably to the estimates of Lieut. Dillahunty and Trimble, the amount of excavation required, in

* Agreeably to a statement in the possession of the authors of this narrative, the aggregate amount paid to Mr. Lloyd, the builder of the masonry on the city division, the Gwynn's falls bridge and the Gadsby's run bridge is $124,500, exclusive of the sums paid to Jacob Councilman for stone delivered, of any payments for turnpike tolls, which amount to about $1000, and of any allowance for the privilege of quarrying stone, except for that brought from Port Deposit. Agreeably to the same statement, the charges for these several works stand thus, viz:

Cost of masonry on	city division,	including Gwynn's run bridge	$20,757,56
Do.	do.	Gwynn's falls bridge - - - -	70,638,96
Do.	do.	Gadsby's run bridge - - - -	33,133,48
		Amounting to - - -	$124,500,00

It is pertinent to remark in this place, that in the final settlement with Mr. Lloyd, which took place subsequently to the dissolution of the Board of Engineers, there was obviously a disposition on the part of the agents of the company, ostensibly to reduce the cost of the Gwynn's falls bridge at the expense of enhancing those of the other two items, far beyond their actual expense.

order to open a thorough-fare through the ridge dividing between the waters of Gwynn's falls and those of the Patapsco, on a level with the established grade of the Rail-road, viz: (66 feet above mean tide) was about 312,000 cubic yards. Of this amount agreeably to estimates made by the same officers, about 264,000 cubic yards have been excavated at an aggregate expense of more than $120,000, or 45½ cents per cubic yard. The quantity of earth still to be removed from the cut is about 20,000 yards, the cost of which estimated at 45½ cents per cubic yard, will be $9,100, making the aggregate minimum cost of excavation at the deep cut $129,100, instead of $88,030. (See Doc. W.) for which it is believed the work might have been executed in due time, had it been prosecuted under proper management, and with due economy.* (See narrative, p. 68.)

* At the instance and under the immediate direction of Col. Long, President of the Board of Engineers, an experiment was tried at the deep cut, in order to ascertain the economy and efficiency of using the plough as a means of loosening the earth. The excavations at the time had been made to about two thirds the depth of the cut. The earth to be removed was of the most indurated and unyielding character. The average distance to which it was required to be transported, was about a quarter of a mile. The team employed consisted of eight yoke of oxen. The time occupied in ploughing was less than three hours. The quantity of earth loosened was at least one hundred and twenty cubic yards. Hence the cost of excavating and removing that quantity, cannot be fairly estimated at a rate more expensive than the following, viz:

Eight yoke of oxen, one-third day, at $1 per day each,	$2,66⅔
Seven attendants do. do. do. - -	2,33⅓
Throwing 120 cubic yards of earth into carts, at 8 cents per yard, - - - - - - - -	9,60
Transportation of ditto, through a distance of one quarter of a mile, at the rate of 12½ cents per cubic yard, - - -	15,00
Amounting to	$29,60

Which is equivalent to twenty-four and two-third cents per cubic yard, for excavating, in what was regarded the hardest part of the deep cut.

Making all due allowance for the cost, wear and tear of tools, &c., this very difficult part of the excavation might have been accomplished at a rate not exceeding twenty-eight cents per cubic yard, as stated in the Appendix; (See Document W.) especially when it is known that the excavated earth might have been conveyed away on level or descending tracks. (See chap. iv. p. *101 to 103.*)

It has been urged as a delinquency on the part of the Board of Engineers, that the change in the grade at this place, which was adopted by them on the 18th day of August, 1829, ought to have been made long prior to that date, and would have resulted in a saving of much expense. In regard to this allegation we shall merely observe, that the change introduced at this late date, resulted in the saving of the expense attendant on the removal of at least 20,000 cubic yards less than was originally contemplated, and that a greater saving might have been made, could the Board of Engineers have foreseen, at an earlier date, the difficulties that induced the change. The propriety of introducing the change, as heretofore remarked, is based exclusively on the occurrence of quick-sands and springs of water, the injurious effects or even existence of which could not be ascertained till the work was far advanced.

Remarks on the City Division.

The grading and masonry of this portion of the road were farmed out by the Superintendent, who, as usual on other parts of the work, assumed the privilege of concluding upon the prices for which they were to be executed, without authority from the Board of Engineers. The aggregate quantity of earth to be excavated, was about 84,000 cubic yards: the original price stipulated for the removal of which was eighteen cents per yard, or about $15,120 for the whole. The actual cost of grading, on the city division, has amounted to $23,156, or $27½ cents per cubic yard.

With respect to the cost of masonry on the city division, it is worthy of particular notice, that the rate at which it was originally stipulated to be done, was at the exorbitant price of $4 per perch for rough rubble work, exclusive of any allowance for the right to quarry stone, which was found in abundance in the immediate vicinity of the site where most of it was to be used, viz: at Gwynn's run. It appears that an extra allowance

for any dressed work that might be required, was to be made, and that the cost actually incurred for the masonry on this part of the road, was as follows, viz:

3,560½ perches at $4, - -	$14,242
166 perches arch work, at 15,	2,490
Amounting to - -	$16,732

Although this amount is known to have been amply sufficient to cover all the expenses incident to the masonry on the city division, yet in the final settlement for this part of the work which took place subsequently to the dissolution of the Board of Engineers, an additional allowance of one dollar per perch was made, together with an allowance of about $300 for wear and tear of tools, for reasons that have not as yet been explained; thus making the aggregate cost of the masonry on this division, amount to $20,757.

Hence the aggregate cost of the city division, exclusive of the expense of laying rails thereon, has amounted ostensiby to $43,914.

Of the reputed contract prices for grading and masonry.

All of the contracts for masonry, as well as for grading, with a very few exceptions only in, reference to the latter, were mere verbal arrangements or understandings, as was clearly shown before a committee of the directors, whose proceedings will hereafter be noticed. At any rate, the Board of Engineers were left in doubt as to the nature, character and terms of the arrangements entered into between the Superintendent and the reputed contractors, till a long time after the work of construction had been commenced. Nor did it appear till a short time prior to the investigation that took place before the committee above alluded to, in the last quarter of 1829, that the operations confided to the Superintendent, and especially those relative to the construction of bridges, culverts, &c. had been carried on, with no other semblance of an obligation on either party, than what

might be inferred from a mere verbal understanding, and with no other evidence of the nature and provisions of the agreements, than the mere verbal admissions of the Superintendent and of the reputed contractors. The confusion and uncertainty resulting from this state of things, render it utterly impracticable for us, with the means now in our possession, to state with precision, the prices actually paid on most of the sections, either for grading or for masonry.

In reference to the cost of construction generally, and in further explanation of Doc. W. of the Appendix, it should moreover be observed that the distance to which the excavated materials have been transported has seldom exceeded 500 yards, and that stone suitable for the masonry has generally been found in the immediate vicinity of the Rail-road, except on sections No. 2 to No 11, of the first Division, for which the stone was procured at various distances from one to four miles from the sites where it was required, (See Appendix, Doc. W.)

In conclusion of this part of the Narrative, we shall subjoin a few remarks explanatory of the opinions entertained by the President of the Board of Engineers in reference to the conduct of the Superintendent in the discharge of the duties assigned him by this Board.

Immediately after the return of Mr. Knight and Captain McNeill from England, Col. Long apprised these gentlemen that Mr. Wever had in repeated instances disregarded the instructions of the Board of Engineers, relating not only to the manner in which the work should be executed, but to that of accounting for the funds placed in his hands, and that in his opinion, Mr. Wever had rendered himself unworthy not only of the station he held in the Rail-road service, but of the confidence of

the Board of Engineers, in consequence of the reiterated derilictions of duty with which he was chargeable.

Col Long had previously expressed the same opinion and the reasons of it, to the President of the Company, who was not only a member of, but the organ of communication between the Board of Engineers and the Directors, and again repeated it to that officer on this occasion.—Col. Long deemed it a tribute due to candour, thus openly to declare his sentiments in regard to the Superintendent, in order that his colleagues might be fully aware of the attitude in which he stood to that individual, as an agent in the employ of the Board of Engineers. Yet in order to avoid the imputation of being influenced by mere prejudice or personal considerations, he was willing to waive any discussion of this question, till his colleagues should have an opportunity to judge from their own observation, of the injurious consequences likely to result to the Company from the habitual neglect of the Superintendent, to comply with the orders and instructions of this Board. Of these consequences he had repeatedly forewarned the President of the Company, and had used his most strenuous efforts to avert them.

On the 8th of July 1829, the accounts of the Superintendent due at the expiration of the Quarter ending on the 30th of the preceding month, being then under consideration, and no returns having as yet been received, from which the amount of work done during that quarter, conld be inferred, Col. Long prepared and read before the Board of Engineers, a remonstrance (See Appendix Doc. H. 2.) against the approval of any accounts that may not have been rendered in conformity to the regulations of the Engineer Department, and especially against the approval of the accounts of the Superintendent for the quarter ending on the 30th June, 1829, until an adequate statement or report showing the progress made in the construction, and the amount of work done, during that quarter shall have been made and submitted in due form by the Superintendent.

The accounts of the Superintendent here alluded to, although unaccompanied by any returns setting forth the quantity of work

done, and of a character no less exceptionable in other respects than those rendered at the close of the preceding quarter, were nevertheless passed, in a qualified manner, by a majority of the Board of Engineers, who regarded the decision of the Committee on Accounts, heretofore noticed (See Narrative p. p. 137 to 140.) as a precedent by which the Board must be governed in any disposition they might now or hereafter make in relation to the accounts of the Superintendent.

For an account of the proceedings of the Board of Engineers had subsequently to Oct 1, 1829, and prior to the dissolution of that body, the reader is respectfully referred to Part II. in continuation of this Narrative.

END OF PART I.

PART II.

IN

CONTINUATION OF THE NARRATIVE,

AND CONTAINING AN

EXPOSE OF FACTS,

BY

WM. GIBBS McNEILL,

Captain U. S. Topographical Engineers.

APPENDIX,

CONTAINING

SUNDRY DOCUMENTS,

EXTRACTED FROM THE

Proceedings of the Board of Engineers,

AND REFERRED TO IN THE

PRECEDING NARRATIVE.

[illegible]

APPENDIX.

A. (See Narrative p. 18.)

The following extract from the proceedings of the Directors of the Baltimore and Ohio Rail-road Company, was submitted to the Board of Engineers, April 12, 1828.

The Committee appointed to make arrangements for the engagement of Lt. Col. Stephen H. Long and Jonathan Knight, Esqr., as Engineers of the Baltimore and Ohio Rail-road Company, Report:—That they have had the necessary conferences with those gentlemen, and have entered into an arrangement to employ them both at the rate of $3,000 each per annum, which salaries are to include their personal and travelling expenses, and are to commence from the first day of January, 1828.

By the agreement between the Committee and those officers, it has been arranged, that they enter into the service of the company upon terms of equal rank and grade, and that they and the President, ex-officio, of the Company, constitute a Board of Engineers.

Signed, GEORGE HOFFMAN,
PATRICK McCAULEY,
ALEXR. BROWN,
JOHN B. MORRIS.

April 6, 1828.

B. (See Nar. p. 21.)

The Board of Engineers having met on the 12th day of April, 1828—present the whole Board:

PHILIP E. THOMAS was appointed President of the Board, and JONATHAN KNIGHT, Secretary.

The following resolution of the Directors of the Baltimore and Ohio Rail-road Company was produced and read:

"*Resolved*, That the Board of Engineers be authorized to employ a Superintendent of Construction, at a salary not exceeding two thousand dollars per annum, whose duty it shall be to aid in arranging contracts for the execution of work upon the Rail-road, and to see that all contracts for the construction of the said road be faithfully carried into effect, and also to perform such other duties connected with this service as the said Board may direct."

Whereupon it was, on motion, *Resolved*, That Caspar W. Wever be appointed Superintendent of Construction, and to perform such other duties connected with this service as the Board may direct, and the President was requested to advise him thereof.

In order to ascertain the most eligible routes by which the Rail-road may be conducted within the limits of the city of Baltimore, *Resolved*, That Col. Long direct the necessary surveys and levels to be taken, and that he report the results to this Board.

April 12th, 1828.

C. (See Nar. p. 22.)

At a meeting of the Board of Engineers, 21st April, 1828. present the whole Board:

Col. Long reported, that he had, in pursuance of the instructions of the Board, directed the necessary surveys and levels to be taken within the limits of this city, and that Lieut. Trimble, with a party of five men, took the field on Monday, the 14th. Lieut. Barney, with a similar number, on the 15th, and Lieut. Gwynn, with a similar party, on the 17th, and that these officers were now proceeding in the execution of the duty assigned them.

The President reported, that he had, as directed, written to Caspar W. Wever, informing him of his appointment of Superintendent of Construction, and that he had accepted the appointment.

April 21st, 1828.

D. (See Nar. p. 24.)

Resolved, That surveys be forthwith made under the directions of Col. Long, for the purpose of ascertaining the best location for the proposed road, from the City of Baltimore, to the valley of the Patapsco; and thence up the said valley as far as to the Union Manufactory, or its immediate neighborhood, according to the following instructions:

A base line, on a level of 60 feet above tide, to commence near the water works, on Jones' falls, proceed across the summit in the nearest direction to the nearest drafts leading into Chatsworth run: down said run to the same level, and thence by the windings of the high grounds on the same level, to a point westward of Mount Clare: thence across Gwynn's falls, and ascend to the same level near Capt. Spence's: thence pursue the

same level crossing the Washington turnpike, and winding in a direction for the lowest pass across the ridge, dividing between the waters of Gywnn's falls and those of the Patapsco: descend to the same level, and continue the base line along the sinuosities of the hills bounding the valley of the Patapsco, till the base line coincides with the surface of the water in that stream.

In running the line above-mentioned, care must be taken to have bench marks distinctly made on the point of every spur and prominence, marked and numbered with red chalk. Similar bench marks must also be made in every ravine and recess.

From the bench marks first mentioned, levelling lines must be run to the highest summits in their vicinity, and terminated by bench marks. From the other bench marks, lines must also be run downward to the gorge of each ravine, and upward to its extremity, terminated in both directions by bench marks, made as before mentioned.

A line of levels will also be run, commencing near the 6 miles stone on the Washington turnpike, having been previously connected with the base line before mentioned. This line will be carried in a direction towards the Avalon works, for the purpose of ascertaining the depths of cuttings and the heights of embankments attendant upon a level route in this direction: care being taken to run the line, so that the excavations and embankments may be the least possible in that general direction.

This line will be resumed at the same level, (about 90 feet above tide) in the valley of the Patapsco, and carried upward along the stream at the same elevation above tide, till it coincides with the surface water of the Patapsco.

This line will be resumed at an elevation a little above the reach of the highest freshets, and continued upward along the valley of the Patapsco at that elevation above the river to Ellicott's mills, having crossed the Patapsco at Pierponts rocks. Bench marks to be made at intervals of one mile each, or nearly so. A line will be run from Gwynn's falls, commencing at the mouth of the run, between Capt. Spence's and the Washington road, and conducted up the run to its source: and thence by the lowest and most direct pass across the ridge, to the base line in the valley of the Patapsco, or some one of its tributaries. Care will be taken in running the base line first mentioned, to connect with it other lines passing over the points of the spurs and hills, and through the ravines: crossing thence in the best directions for a location of the road: keeping in view a state of minimum, excavation and embankment.

Signed,
J. KNIGHT,
May 5th, 1828.
S. H. LONG.

E. (See Nar. p. 26.)

At a meeting of the Engineers, 12th May, 1828—Present Col. Long and P. E. Thomas. The President stated, that he had been authorised and instructed by the Directors of the Baltimore and Ohio Rail-road Company, to take measures for the early location of the road, along the east bank of the Potomac river, commencing at the Point of Rocks, about seven miles west from the mouth of Monocacy; and thence as far as Cumberland: and that it was desirable in the first instance, to secure for the Company, the occupancy and possession of such sections within these limits, as are deemed indispensable to the advantageous location of the road. Whereupon, *Resolved*, That the necessary surveys be forthwith made, and in order to fully effectuate the object of the Company, the following instructions be given to Col. Long, and to Capt. McNeill, who are desired to proceed immediately to the execution thereof.

Agreeably to a resolution of the Board of Engineers of the Baltimore and Ohio Rail-road Company, dated on the 12th May, 1828, directing a survey of certain tracts or parcels of land, situated on the north eastern bank of the Potomac river, with a view to a partial location of the Rail-road, the following surveys and location will forthwith be made, to wit: commencing on the eastern shore of the Potomac about 10 perches below the point denominated the "Point of Rocks," and running upward along the margin of the river in such a manner and direction as to pass said Point of Rocks, and all other similar precipices, and all abrupt river hills or bluffs, between the bases of which and the margin of extreme low water the space or bottom does not exceed 200 feet in width; the surveys to be continued along the said north eastern shore at all such places and points as herein before first designated, from the place of beginning to Cumberland, in Alleghany county, except at such points as will admit of a judicious and beneficial location more or less remote from the valley of the Potomac.

The dimensions of the aforesaid tracts or parcels and their localities, when surveyed, will be as follows: In all situations, where the space between the bases of the bluffs or precipices and the margin of extreme low-water does not exceed 66 feet, a line will be run along such base or the slope, or summit of the hill or precipices above it, at the distance of 66 feet, as above stated, from the margin of low-water measured horizontally, in a direction, as nearly as may be, perpendicular to the course of the river in its immediate vicinity. In all situations where the space, as above, has a width greater than 66 feet and less than 200 feet, the tract to be surveyed (which must be, as before, 66

feet wide,) will be carefully selected with a particular view to embrace the greatest facilities for the construction of the road, and for placing it beyond the reach of the highest freshets.

The lines bounding the several tracts that may be surveyed will be designated by stakes, or other land marks, set along the slopes of the bluffs or hills, at such intervals as may correspond to the angles made by a continuous line, surveyed as nearly as may be, parallel to the eastern shore of the Potomac river, or to the bluffs bounding its valley.

The foregoing surveys will be executed, and plots, illustrative thereof, carefully drawn; correct copies of the plots to be furnished for the use of such civil officers as may be appointed by the President of the Rail-road Company to receive them.

In addition to the surveys above specified, other tracts contiguous to those above designated, will also be surveyed on account of the Rail-road, for the purpose of securing to the company quarries of stone applicable to the construction of the Rail-road.

Any tract or parcel of ground having been surveyed, a description thereof, setting forth its boundaries, &c., will be delivered to the agent or agents employed by the Rail-road Company, to obtain a legal title thereto.

Lt. Col. Long is directed to carry into effect the foregoing instructions, so far as they relate to the route situated between "the Point of Rocks" and the mouth of Conogocheague. Capt. McNeill is also directed to carry the same into effect, so far as they relate to the route between the point last mentioned and Cumberland.

May 12, 1828.

G. (See Nar. p. p. 27, 32.)

At a meeting of the Board of Engineers, 29th May, 1828—present the President and Lt. Col. Long:

The following communication was received from the Directors of the Baltimore and Ohio Rail-road Company:

Office of the Baltimore and Ohio Rail-road Company, 28th May, 1828.

TO THE BOARD OF ENGINEERS:

Gentlemen,—Annexed, I hand you a copy of a resolution which was this day passed by the Directors of the Baltimore and Ohio Rail-road Company.

You are accordingly required to proceed to carry the same into effect as early as practicable.

Signed, P. E. THOMAS, Pres't.

"*Resolved*, as the sense of this Board, that the southern route by the Point of Rocks, as recommended by the Engineers, is the course most suitable to be adopted by this Board, and that the Engineers be instructed forthwith to locate the road between the Point of Rocks and the limits of the city of Baltimore, *and that they keep in view that the same shall terminate at a point best calculated to distribute the trade throughout the town as now improved.*"

Whereupon, it was *Resolved*, That the surveys now in progress under the immediate direction of Lt. Gwynn, for the purpose of ascertaining the feasibility of a route connecting between Parr's Spring and the valley of the Potomac river at the Point of Rocks and leading in part through the valley of Bennett's creek, be executed with all practicable despatch. Also, that the surveys now in progress, under the immediate direction of Lieut. Cook, between Gwynn's Falls and the Patapsco, be also expedited as fast as practicable. Also, that the officers and assistant engineers be required to complete the drawings in which they are now engaged, with the least possible delay. It was further *Resolved*, That additional surveys along the valley of the Patapsco, and in such other places as may be thought necessary, be commenced as soon as the requisite officers can be spared from other duties and assigned thereto, and that the drawings necessary to illustrate the whole, be furnished as early as practicable.

May 29th, 1828.

I. (See Nar. p. p. 27, 45, 73.)

Pursuant to a resolution of the Board of Directors of the Baltimore and Ohio Rail-road Company, authorising their Board of Engineers to receive proposals, and to enter into arrangements with persons disposed to engage in the performance of labour for the construction of the Baltimore and Ohio Rail-road. Notice is hereby given, that from and after the 15th inst. to the first day of July next, proposals will be received at the office of the Board of Engineers of the Rail-road Company, setting forth the prices at which the following items of labour will be performed, to wit:

1. Excavation of clay, sand, or gravel, requiring the use of the plough and shovel merely.
2. Do. of clay, sand, or soil, mixed with pebbles or loose stones.

3. Excavations of clay, sand, and soil, mixed with gravel, hardpan, &c. requiring the use of the same utensils, together with the pick or mattock.
4. Do. of slate, and other soft rocks, where no blasting will be required.
5. Do. of slate and free stone, where blasting will be required.
6. Do. of limestone, where blasting will be required.
7. Do. of granitic rocks, greywack, &c. where blasting will be required.

The price per cubic yard, for which the foregoing excavations will be made, and the excavated materials removed to a distance not exceeding 15 feet from the site of the road bed, or thrown into wheelbarrows, or carts, for transportion, will be stated in connexion with the several items above specified.

Transportion of the materials above-mentioned, together with depositing and levelling the same, in such a manner as to form the bed of the road, said transportation to be on level or descending ground, for the following distances, viz:

More than 5 yards and not exceeding 100 yards.
" 100 " " " 250 "
" 250 " " " 450 "
" 450 " " " 900 "

The several prices for transportation per cubic yard, to be annexed to the foregoing items.

It is to be understood that the materials excavated as above, are to be transported in the direction and upon the immediate site of the bed of the road: the transportation to be effected in the most economical manner, by means of barrows, scrapers, carts, or other suitable machines.

Construction of dry walls, per perch, of twenty-five cubic feet of such materials, and in such manner as may be approved of by the Board of Engineers, or their agents.

Do. of wet walls, or walls laid in groute or mortar, agreeably to the conditions above mentioned.

The materials for construction to be procured and conveyed at the expense of the contractor, (the stone in the quarry being free of expense, and situated at a distance not exceeding one half mile from the work.) The prices to be annexed to the foregoing items—also,

The whole to be executed under the direction and superintendence of the Board of Engineers, or such agent, or agents, as they may authorize and appoint for that purpose.

Any person, or persons, wishing to contract for the performance of the labour above specified, will forward, post paid, sealed proposals in the terms of this notice, stating also the amount of labour, he or they may wish to perform: said proposals to be marked, and addressed as follows, viz:

Proposals.—"Board of Engineers of the Baltimore and Ohio Rail-road Company, Baltimore, Maryland"—and to be regarded as preliminary to contracts hereafter to be made between the Board of Engineers, or their accredited agent, on the one part, and by the person or persons making such proposals as are deemed acceptable, on the other part. It is proposed to commence the work as early as practicable in July next.

Signed, S. H. LONG, } *of the Board of*
June 2d, 1828. J. KNIGHT, } *Engineers.*

K. (See Nar. p. p. 28, 32.)

At a meeting of the Board of Engineers on the 6th June, 1828: Present the whole Board—

The President communicated the following resolution from the Board of Directors, viz:

Resolved, That the commencement of the Road take place on the 4th day of July, 1828, without the limits of the City.

Whereupon, Resolved, That additional surveys for the purpose of determining the most suitable point for commencement, be made as soon as practicable, agreeably to the following instructions, viz: Commencing at an elevation of 60 feet above midtide, in the first ravine eastward of Mount Clare: thence running by the nearest and best route north of Mount Clare to the valley of Gwynns' run: thence crossing Gwynns' run, and resuming the same level on the western bank: thence crossing the point of land situated between Gwynns' run and Gwynns' falls on the best route for a level road at that elevation: thence crossing Gwynns' falls to a point situated at the same elevation above tide, and near the extremity of the ridge, on which Mrs. Spence's house is situated: thence along the eastern slope of said ridge, in a direction to cross the Washington road at the most suitable pass; and thence to connect with some convenient and proper bench mark, on the 60 feet level line recently run by Lt. Cook. Care being taken to fix bench marks on the slopes of the hills bounding the streams, and at all points where it may be necessary to ascend or descend from said level, and generally one bench mark in every half mile of distance.

In like manner, a similar line will be run on a level of 70 feet, another on a level of 80 feet, and another on a level of 90 feet above tide, commencing at these several elevations in the ravine east of Mount Clare, first mentioned, and terminating at bench marks placed on the south eastern slope of the ridge, over which the Washington road passes south-westward of Gwynns' falls, and at the respective elevations above mentioned.

At all the bench marks stakes will be set, blazed and marked with red chalk, so as to exhibit the respective elevations intended to be represented by said bench marks.

The surveys above mentioned having been completed, a line 90 feet above mid tide will be run, beginning at the bench mark at that elevation, which had been placed near the extremity of Spence's ridge before mentioned, and running along the western slope of said ridge, and connecting at the most suitable point with the 90 feet level line, run agreeably to the foregoing instructions.

The several routes aforesaid will be surveyed, levelled, and noted, in such manner as to enable accurate estimates to be made of the quantity of the respective excavations, and embankments on each, and so as to exhibit accurate profiles of the same.

June 6, 1828.

L. (See Nar. p. p. 30 to 37, 74, 86, 109, 118, &c. &c.)

REGULATIONS FOR THE ENGINEER DEPARTMENT.

Organization of the Engineer Department of the Baltimore and Ohio Rail-road company, providing a system for the government of the same; and for securing a strict accountability in the fiscal operations of the Baltimore and Ohio Rail-road company, and economy in the disbursement of its funds.

1st. The Engineer Department shall consist of the Board of Engineers, of which the President of the company is *ex-officio* a member, and who will be the organ of communication between the Board of Engineers and the Directors of the company—of such topographical engineers and assistant engineers as may be appointed by the Board of Engineers—of the superintendents of construction—and of such assistants as he may, with the consent and approbation of the Board of Engineers appoint: whose several duties shall be as hereinafter explained.

2d. The duties of the Board of Engineers shall comprise a general superintendence and control of all the operations relating to the examinations and surveys for, and the location and construction of the Rail-road, and the works appurtenant thereto—the definitive location of the road—and the manner of constructing it in all its parts and appendages—the formation of plans and estimates, and the receiving proposals and concluding contracts for the construction of the road, or any of the works pertaining to it—subject in all cases to the control of the Board of Directors.

Rules and regulations for the government of the officers and assistants while engaged in the office duties, shall be instituted by the Board of Engineers—the board shall also give the requisite instructions to the topographical engineers, as well in the field as in the cabinet; and instructions from a member of the board will, at all times, be received as from the board: and it shall be competent to the board to decide upon, and regulate the number of assistants that may be required for the performance of the various duties of the Engineer Department.

It shall, moreover, be the duty of the Board of Engineers, on or about the 1st day of September, in every year, to make to the President and Directors a report of the progress of the operations of the Engineer Department during the preceding year—the report to contain a narrative of the progress of the operations from the commencement of the year, a review of the resources of the country adapted to the purposes of construction, a statement of contracts entered into within the year, the character and resources of the contractors, and an expose of the plan of administration under which the operations were conducted. The report will also include a statement of the objects to which the board may conceive it most advantageous to the service that their attention should be directed, during the ensuing year, the order in which they should be attended to, the probable periods of commencing and completing each, respectively, and a project of the probable means that may be requisite for carrying them severally into effect, accompanied with an approximate estimate of the expense. They shall also at any other time, furnish whatever information they may possess in regard to the operations of the Department, whenever the Board of Directors shall demand it.

3d. The topographical engineers, to whom will be assigned the requisite number of assistants, shall have, under the direction of the Board, the immediate superintendence of all the surveys and locations, and of the drawings relating to them; and will be exclusively responsible for the organization and arrangement of

all the details incident to the fulfilment of the objects which may be contemplated by their instructions; and they, or their assistants may, as the exigencies of the service shall require, be associated with the superintendents of construction on duties relating to the construction and repair of the Rail-road.

An assistant to the President of the company may be selected by him from among the topographical engineers, or their assistants, who, besides aiding the President in the discharge of his administrative duties, and performing such topographical duties as may be assigned him, may also be charged, under the President and Board of Engineers, with the preservation of the correspondence of the board, and all communications relating to the work; and with the safe keeping of the instruments, books, maps, plans, topographical reports, descriptive memoirs, archives, and other office property belonging to the company; and shall be responsible, not only for their good preservation, but for their arrangement, which shall be such as to admit of the most ready reference.

The Board of Engineers may, from time to time, appoint such officers or assistants as may be necessary to aid the Board in the discharge of its duties.

4th. The superintendent of construction, whenever any part of the road shall have been finally located, will be furnished with plans and instructions for his guidance in the construction thereof, and will be held responsible for the faithful execution of the work, in strict conformity to them. He will receive all his instructions from the Board of Engineers, and will make to them such stated reports, returns and estimates as shall hereinafter be mentioned.

5th. The topographical engineers and the superintendent of construction shall, severally, when assigned to the superintendence of any operation, furnish to the Board of Engineers a general project for carrying on the same, accompanied with a detailed estimate of the expenses; which estimate, on its approval, will be transmitted by the Board to the President of the company; and, during the progress of their operations, they will respectively, on the first day of each month, make to the Board an individual report of themselves, and the officers doing duty with them as assistants; stating what have been, during the past month, and what are expected to be during the current month; their movements and operations; a general quarterly return of property under their charge, shewing its condition at the commencement and expiration of the quarter, and tracing its alterations from previous returns; and a monthly estimate, to accompany the monthly report, shall also be furnished.

They will, also, while superintending works under construction or repair, or conducting the surveying and other operations of a scientific nature, keep a journal of their proceedings, in which they will state the means applied, the manner and effect of the application, and every other circumstance worthy of observation incident to the progress of the operation in which they may be engaged; and when the operation shall have been completed, they will transmit the journal to the Board of Engineers, to be deposited in the archives of the company.

6th. All officers attached to the service of the Rail-road company, to whom instruments, books, stationary, and other property belonging to the company may be intrusted, shall render quarterly returns thereof, and shall be responsible for the same; and all returns and estimates, with the vouchers for disbursements (until other forms shall be prescribed) shall conform, as nearly as the nature of the two services will admit, to those prescribed in the regulations for the United States' Engineer Department.

7th. The following instructions will be observed in keeping and rendering the accounts for disbursements made on account of the Baltimore and Ohio Rail-road:

Bills of parcels, with explicit receipts, must be taken for all purchases and expenditures, except those for services, and must set forth the nature, quality, price, and other circumstances connected with them, which may be necessary to afford a clear view of the subject. There must be also attached to them, a certificate from the disbursing officer, declaring, as the case may be, the article purchased to have been received, or the objects of expenditure to have been effected, and stating distinctly and particularly for what purposes the articles or objects were intended. Expenditures for services must be exhibited on separate monthly rolls; for the services of labourers and mechanics, respectively, during each month; and must also contain a certificate, declaring that the services charged were performed; and as far as possible, must state the objects to which they were applied. At the close of each quarter, a quarterly abstract must be made by each disbursing officer, of the vouchers for purchases and expenditures during the quarter, including the rolls for services; and a quarterly account current, exhibiting the monies received and expended during the quarter, and the balance due to or from the company.

These abstracts and accounts current, with the vouchers supporting them, are to be transmitted to the President of the company, within ten days after the expiration of each quarter; and when so transmitted, are to be by him laid before the Board of Engineers, for examination with respect to prices, and the ob-

ject and character of disbursements, compared with the nature and extent of expenditures, as exhibited in the monthly estimates. Should any of the accounts be found objectionable, they must be returned to the disbursing officer for explanation and correction; and when the examination shall have been completed, they will be delivered to the President, and if approved by him, are then to be transmitted to the Treasurer of the company for settlement; accompanied by a statement, that they have been examined agreeably to this regulation, and were approved; and the Treasurer will then pass to the credit of the disbursing officers, such accounts as have been approved by the President, exercising only a discretionary power as to the validity of vouchers.

8th. When property is not accounted for, nor its loss satisfactorily explained, the person to whom the care of it has been confided, will be charged with the value thereof: and if, during the progress of the operations, the Engineer or Superintendent to whom funds may have been advanced, shall, in the exercise of his judgment, confide the disbursement of the same, or a portion thereof, to subordinate agents, such Engineer or Superintendent will be responsible notwithstanding, for whatever amount may have been advanced him on the requisition of the President; and no accounts will be opened by the Treasurer, between such subordinate agents and the company.

9th. A statement will be made by the Treasurer, within fifteen days after the expiration of each quarter, to a committee of the directors, exhibiting the fiscal operations during the quarter, and it shall be the duty of said committee, carefully to examine and report fully to the President and Directors the opinion which they may entertain as to the proper or improper application of the funds of the company; and to recommend the adoption of any further measures, which may more effectually secure due economy, and ensure the individual responsibility of the disbursing agents.

10th. The report of said committee will be made in writing, that it may be recorded among the archives of the company.

11th. Funds will be advanced by the Treasurer of the company, only on the requisition of the President, which requisition must be founded on the estimate of the disbursing officer, agreeably to regulation five; and payments on the fulfillment of contracts for the construction of the road, will be made by the Treasurer on the order of the President; which order will only be given on the certificate of the Board of Engineers, from an inspection of the work, that the contracts have been fulfilled.

12th. Payments in the city of Baltimore, for contingent expenses, will be made by some one to be designated by the President, who will so far as they may be applicable, be governed by the foregoing regulations.

June 10, 1828.

N. (See Nar. p. 42.)

Instructions prepared by Mr. Knight, for Capt. McNeill's brigade.

Sir,—You will forthwith commence with your party the location of the Baltimore and Ohio Rail-road at a point without the limits of the city of Baltimore, and near to the place where the corner stone was laid at the celebration on the 4th inst., and at an elevation of sixty-six feet above the level of mid-tide.—From thence proceed with the location to the valley of the Patapsco, and thence up the left side of that stream to near Pierpont's rock; there cross the stream to the right bank, and thence proceed with the location upon that side to some suitable point near the Frederick road.

In making this location, you will choose the ground so as to get the shortest and best route, having due regard to angles, to expense of construction, and to permanency. In order that the road at any place shall not have too much curvature, the distance to be run on any course shall not be less than 100 feet, nor the angle of deflection between any two curves greater than 14½ degrees. In general, the greater the radius of curvature, the *greater* will be the effective power of traction upon the road, and consequently the angle of deflection at any point should be as much less than 14½ as practicable. It is supposed that in the vicinity of Gwynn's falls, the angle of deflection may not be greater than 2½ degrees. The same level, to wit, 66 feet above mid-tide, is to be extended, allowing for cuttings and embankments, so as to get the best route for the Rail-road from the point of commencement to the termination of the embankment across Dorsey's run, situated in the valley of Patapsco above the Avalon works. Here the said level will be departed from, and the location will be made to rise upon a gradual ascent of 13 feet per mile to a point at the surface of the ground across the Frederick road. It is believed that this ascent will enable the location to cross the Patapsco at Pierpont's rock, at a sufficient elevation above the highest freshets, and that it will cross the Frederick road at an altitude above it of 14 feet, so

that the travelling upon that road may pass *under* the Rail-road. It is believed that the lines run by Lieut. Cook under his late instructions, will generally indicate the best route; should there be doubt at any place, an experimental line must be run to enable a correct decision to be made. The first point of crossing the Washington road, must be determined by running around the high grounds, making sufficient excavation across the road, to allow it to pass over the Rail-road, which will require 20 feet cutting, unless the Washington road could at that place be elevated above its present level; in that case, the cutting might be so much less. Then a line must be run across the ridge and the said road in a direction from some point near Spence's run to some point near Charles' run, so as to get a practicable line of least distance. These two lines will then be compared, and the best one adopted. Hence the location will be continued to the ridge dividing the waters of Gwynn's Falls from those of Patapsco. This ridge will be crossed with the best line on the supposition of an open cut; after which you will cross it with the best line, on the hypothesis of a tunnel one quarter of a mile in length. Then the location will be continued around the mine bank hill, and across the valley of Gadsby's run at the best point; thence to that of Still-house run, at the most suitable place; thence across the point of hill, in a proper manner, to the immediate ravine of the Patapsco, and thence up the same as aforesaid. Conspicuous stakes will be placed at every horizontal angle and at proper distances apart, where either excavation or embankment will be required; on these stakes will be marked the number of feet which must be cut or filled, and designating whether it is to be an excavation or an embankment, by writing on the stake the word "cut," or "fill," as the case may be. References, by course and distance, will occasionally be taken to marked trees. Bench marks will also be made on each half mile of distance. Correct profiles of ground requiring excavation or embankment, will be taken along the line and staked as before mentioned. The field books must exhibit all necessary facts in relation to the location, and especially all courses and distances taken, and all heights, together with the slope of the ground at right angles to the location at each station, so that the note books may furnish all the data which may be necessary to form the estimates of the quantity of cutting and of filling, as the case may be, on every respective number or station. You will also note the probable kinds of materials of which the excavations may consist, and their proportions, together with such other remarks as you may deem necessary and proper.

Caspar W. Wever, Superintendent of Construction, is directed to be occasionally upon the ground, in running the said route, that he may gain an intimate knowledge of it and of the localities, and that the officer on duty may avail himself of the experience of Mr. Wever, when any question shall arise on the line requiring it.

You will acquaint the Board of Engineers, from time to time, with the progress made by your party in these operations, commencing with the date of these instructions, and cause a monthly estimate of the expenditures, incident to this service, to be submitted, including the whole of the current month; to which will be appended a brief summary of the operations of your party, during the months of May and June last, rendered agreeably to the form adopted by this Board.

As the proposers for contracts will be notified that the line will be marked out, so that the Superintendent may show them the ground on which their contracts will be made, by the 25th day of the present month, it is requisite, if possible, the route may be located by that time.

S. H. LONG, } *of the Board of*
J. KNIGHT, } *Engineers.*

July 9th, 1828.

O. (See Nar. p. p. 53, 60, 86, 93, &c.)

Office of the Board of Engineers,

Baltimore, July 22, 1828.

Sir.—For your guidance in superintending the construction of the Baltimore and Ohio Rail-road, the following instructions will acquaint you in part, with the views entertained by the Board of Engineers in relation to the dimensions and principles of construction deemed applicable in the execution of the work under consideration.

1*st. Of clearing for the Rail-road.*

The width allowable by law, and appropriated to the use of the road, being sixty-six feet, the ground traversed by said road, will be cleared to that width, and in situations where embankments, excavations, sidelings, or other works appurtenant to said road, and for the location of which, provision is

also made by law, the clearing will occupy such additional width as may be deemed appropriate.

2d. *Of Grubbing.*

In situations where the surface of the road is coincident, or nearly so with the natural surface of the ground, the *grubbing* will occupy a width of thirty-one feet. In situations where *sidelings* are required, an additional width of eight feet six inches will be required for each additional track of the road, and the *grubbing* will be extended accordingly. The width of *grubbing* in all cases of excavation and of embankment, will be at the discretion of the superintendent. No logs, roots or other perishable materials, are admissible in the body of the embankment or its foundation, except in cases where the permanent consolidation of the work cannot be prevented thereby.

3d. *Of Grading or forming the Bed of the road.*

The surface line of the road having been designated by suitable bench marks, and its direction by line stakes appropriately marked, the surface of the road will be adjusted thereto by *Cuttings* and *Fillings* agreeably to the following dimensions, and conditions, viz: The width of the road-bed, at the surface shall in all cases be twenty-six feet. The width of side drains shall be at least three feet, and in *side cutting*, where one only is required, its width shall be five feet. In all *deep-cutting* in earth, sand or gravel, where the depth of the *cut* exceeds forty feet, a berme six feet wide, including a drain three feet wide, is to be provided for on each side of the *cut*, and in all situations where the bank of a deep cut is surmounted by an acclivity of any considerable extent, back drains of such dimensions as the superintendent may deem appropriate, shall be formed in the natural surface of the ground, or in rear of the spoil banks.

The several drains may be paved with stone at the discretion of the superintendent, in order to secure them against the abrasion of currents of water. The width of deep-cuts at the natural surface of the ground, if horizontal, will be such as may result from adding the width of the road surface (twenty-six feet) to three times the depth of the *cut:* and in situations where bermes are required, the width as above will be increased by those of the bermes. The width of embankments, at the natural surface as above, will be such as may result from adding the width of the road surface (twenty-six feet) to three times the height of the embankment. That is to say, the lateral slopes of all banks formed by *cuttings* or *fillings*, shall be such as is indi-

sated by the hypothenuse of a triangle, whose base is to its perpendicular as one and a half to one.

The conditions here prescribed, are deemed applicable in all cases where the embankments or banks of cuttings are composed of clay, marle or other adhesive earths. In other cases, the slopes may be less abrupt, than those implied by the foregoing conditions, at the discretion of the superintendent, and in rocky excavations particularly, where a greater declivity is admissible, the slopes will be determined by the superintendent.

The location and construction of *side walls*, and *culverts*, also of bridges of any span not exceeding twenty feet, is confided to the superintendent, provided the exterior slopes of walls intended for the support of earthen embankments, shall not be less than one in five, inclining towards the embankment, except in cases where they serve as abutments for bridges, against which the weight of the arch communicates a thrust sufficient to counteract any thrust communicated by the embankment supported by the wall. In the construction of piers, it is also provided, that the exterior slopes or talus shall be one in eight, or one-eighth of their height. Provided moreover, that the thickness of any side wall, at the surface of the road, shall not be less than two feet. Also that the dimensions of the water ways through culverts and bridges be such as to give free passage to the water in extraordinary freshets. In the construction of all walls, the size and quality of the stones of which they are composed, the frequency and dimensions of the *counter-forts buttresses*, or of the *back grades* or *steps* necessary for their support, will be regulated by the superintendent, according to the nature of the materials and other circumstances.

You will divide the route as located between the city line and the Patapsco, and along the valley of the latter, to a point a little above the Frederick road, leading across the bridge at Ellicotts' mills, commencing at the point where the corner stone was laid on the fourth instant, into sections of such extent as you may think proper, in order to contract for the *clearing*, *grubbing*, *grading*, &c., as contemplated in the foregoing instructions, and deemed necessary to the construction of the Rail-road. The masonry required therefor, may be executed under separate contracts should you think proper. It is expected that the location of the Rail-road on that part of its route above pointed out, will have been completed on or before the 11th day of August next, at which date the several items of work herein considered, may be provided for by contract. Bridges leading across Gwynn's falls and the Patapsco, will remain as subjects

for future instructions. Provision will be made in your contracts, a form for which you will submit to this board for their approbation, not only for the faithful execution of the work, but for the detention of such a proportion of the sums due therefor, as you may deem necessary to ensure the Rail-road Company against any inconveniences or losses to which they might otherwise be liable, on the failure of the contractor, in the fulfilment of his contract, it being understood that monthly payments at the close of each month, are to be made of such sums as you may think proper to allow on account of work actually performed.

You will report to the Board of Engineers monthly, on the first day of each month, giving a minute detail of your proceedings, and whenever any thing occurs requiring additional instructions, you will address this Board for their directions and orders in relation thereto. To your Monthly Reports, as above mentioned, you will annex a brief abstract of the expenditures, incurred under your superintendence, during the preceding month, and an estimate of those likely to be incurred during the current month.

A copy of the Regulations for the Engineer Department as sanctioned by the Board of Directors of the Baltimore and Ohio Rail-road Company is herewith enclosed, for your information and government in the discharge of your duties as superintendent of construction.

The Board of Engineers are fully aware of the arduous nature of the duties assigned you, and of the high responsibility unavoidably imposed on the superintendents of a work involving the expenditure of many millions. They however congratulate themselves and the Rail-road Company on the acquisition of an experienced agent, in whom they repose full confidence, and in whose management, they feel assured that the most rigid economy, and the most determined activity and zeal will be observed in the promotion of the great object in which they are engaged, and in the accomplishment of which the best interests of our common country are involved.

Signed

S. H. LONG, } *Of the Board of*
J. KNIGHT, } *Engineers.*

CASPAR W. WEVER, Esq.
Sup't. of Construction for the
B. & O. R. R. Company.

P. (See Nar. p. 54.)

Sir,—I am happy to inform you that the course I recommended, in relation to the prosecution of the surveys intrusted to your superintendence, meets the approbation of the President of the Rail-road Company, who also agrees with me in the opinion that they ought not to be intermitted, till forcibly arrested by the civil authority. The Rail-road Company have a legal right, to make any surveys they may deem proper, in the prosecution of the enterprise in which they have engaged, and are yet unacquainted with any authority prohibiting the full and free exercise of that right. You will accordingly prosecute the duties assigned you, with all practicable despatch, regardless of the pretended authority of any one, disposed to interrupt your progress in the service pointed out in your instructions from the Board of Engineers.

You are at liberty, agreeably to the suggestion in your letter of the 16th inst., to execute the surveys authorised between the Monocacy and the Point of Rocks, prior to those that are to be made in the vicinity of Bush creek, should you think it more conducive to the interests of the service and the health of the party.

Signed,

S. H. LONG.

July 19th, 1828.

Q. (See Nar. p. p. 52–55–99, 140, &c.)

Articles of Agreement, made and concluded this day of in the year of our Lord eighteen hundred and twenty between on the first part, and Caspar W. Wever, Superintendent of the Baltimore and Ohio Rail-road, in behalf of the Baltimore and Ohio-rail-road Company of the second part:—

Whereas the aforesaid hath agreed, for and in consideration of the payments herein af-

ter mentioned, to graduate and prepare for the reception of the rail-ways, in a workmanlike manner, a certain part of the aforesaid Baltimore and Ohio Rail-road; which said part is the section of the said road, as recently laid out by the said Company; which said part of said road, thus contracted for, is to be made and completed by the said party, of the first part, in the following manner, and on the following conditions, that is to say:—The trees shall be cut down and cleared in all cases, a width of not less than sixty-six feet; the stumps to be grubbed thirty-one feet in width, in the centre of the said sixty-six feet; the hills to be cut down; the earth, rocks and stumps to be removed; the hollows, vallies, and the abutments of the bridges and culverts to be filled, so that the whole of the road shall have a surface of twenty-six feet in width, and shall be formed in such manner, that when completed, shall conform to such field notes of level, ascent or descent, as shall be furnished by the superintendent. The sides of embankments shall have such slope, as may be formed by giving to them a base of one foot and a half, for each foot of altitude. No stumps, leaves, logs, or perishable article of any kind, to be put in the embankments; where hills are cut through, or the road dug along the side of a hill, the bank or banks to be cut of such slope, as may, in the opinion of the superintendent, be necessary; but in no case shall such slope be less than that prescribed for embankments. One or more ditches or water courses, and of such size as the superintendent may prescribe, to be dug or made on each side of the said twenty-six feet, in all such places as the superintendent may designate. French drains shall be constructed of such size and form, and in all such places as the superintendent may require. In deep cuttings, a birm of such width, including a drain or ditch, of such size and at such altitude as the superintendent may direct, shall be formed on each side of the cutting. All superfluous earth, shall, in the first place, be applied to increase the width of the embankments, and the balance shall be removed to such distance, and there disposed of in such manner as the superintendent may prescribe. In case the cuttings do not supply a sufficiency of earth for the fillings, the deficiency shall be, if so required by the superintendent, taken from the nearest cutting, so as to increase, regularly, the width of such cutting, or from such other place as the superintendent may point out. All iron stone, building stone, or such other material, obtained from the excavations, as the superintendent may direct, shall be carefully preserved, and deposited in such place as he shall allot, for which such premium shall be paid by the said Company, as the superintendent shall adjudge

reasonable and just. Mile stones, of such form and dimensions, and with such letters and figures carved upon them, and painted such colours as the superintendent may designate, shall be firmly planted at such places as the superintendent may direct. At any time that the superintendent may be of opinion, that the good of the work may be promoted by a change or alteration of the location of all or any part of said section of road, it shall be accordingly so changed or altered, upon such terms as may appear right to the superintendent. Wherever the rail-road meets with, crosses, or runs along any road, heretofore used, such bridges are to be built, and such roads opened and prepared, as may, in the opinion of the superintendent, be necessary for the temporary accommodation of the travel. Masons or other persons who may contract with the aforesaid Company for the building of bridges, culverts, walls and structures of wood on any part of the said Baltimore and Ohio Rail-road, shall be permitted by the party of the first part, to select and take from the section of road hereby contracted for, such stones and timber as such mason or other person may think proper, and to haul any material over all or any part of said section which may be levelled or elsewhere, to the place where such stones or timber may be required, without any interruption. In case the said mason or other person shall, in the opinion of the superintendent, damage the said section of road, such sum of money as the superintendent shall assess, shall be, by the said Company, paid to the said party of the first part. The said party of the first part shall commence working on said section at such place as the superintendent may designate. The said section of road shall be made and completed on or before the day of 182 For a failure to make and complete the said section of road, on or before the said day of 182 , the superintendent may asses such damage as he may think the good of the work requires, and charge the contractor with the amount thereof.

The said party of the first part shall not let or transfer his contract or any part thereof, to any other person without the consent of the superintendent, and shall not employ any workmen or labourers who commit depredations on the neighbourhood, or insult travellers or other persons;—and he shall, upon application of the superintendent, discharge any workman or labourer from his employment, and he shall not employ any workman or labourer who has been discharged by any other contractor for improper or disorderly conduct.

Now this agreement, made and concluded on the day of in the year of our Lord one thousand eight hundred and twenty , between of county, in the state of , of the first part, and Casper W. Wever, superintendent of the Baltimore and Ohio Rail-road, for and in behalf of the Baltimore and Ohio Rail-road Company, of the second part; Witnesseth, That the said party of the first part for himself, his heirs, executors and administrators, doth hereby covenant, promise and agree with the said Caspar W. Wever, superintendent as aforesaid, that he the said party of the first part, shall and will, well and faithfully, in a workman-like manner, on or before the day of 182 , make, finish and complete, in the manner and on the conditions herein before mentioned, all that part of the Baltimore and Ohio Rail-road, which is designated by the name of the section; beginning at a place on the said road distant from the western boundary of the city of Baltimore in the state of Maryland, and ending at a point on the said road distant from the aforesaid boundary.

In condition whereof, the said Caspar W. Wever, seperintendent as aforesaid, for, and in behalf of the Baltimore and Ohio Rail-road Company, doth hereby covenant, promise and agree to and with the said party of the first part, his heirs, executors and administrators, that the said Company shall and will, for doing and performing the work aforesaid, well and truly pay or cause to be paid to the said party of the first part, his executors or administrators at the rate of for each and every which said section of road may contain, in the following manner, that is to say:—Each and every month during the progress of the work, the Company aforesaid, by their superintendent, will pay four-fifths of the relative value of such work as may be done, to be judged of by the superintendent, and at such place as the superintendent may appoint, until the whole of the section hereby contracted for, shall have been finished and completed, agreeably to contract, and shall have been accepted by the superintendent, as so finished and completed, when the balance due shall forthwith be paid to the said party of the first part, his heirs, executors or administrators.

And the said party of the first part for himself, his heirs, executors and administrators, further covenants and agrees with the said Caspar W. Wever, superintendent as aforesaid, that in case the said party of the first part shall not well and truly, from time

to time, comply with and perform all the covenants herein before stated and stipulated on his part to be done, performed and complied with, in manner and form and within the time herein before mentioned; or in case it should appear to the superintendent of the said road, for the time being, that the work does not progress or go on with sufficient speed—or in case the said party of the first part, shall not commence the work within such time as the superintendent may direct—or in case the superintendent shall believe the good of the work requires the dismissal of the said party of the first part,—the superintendent may dismiss the said party of the first part, and that then and in that event, the foregoing agreements on the part of the party of the first part, and every clause and part thereof, shall become null and void, and that the unpaid one-fifth part of the relative value of the work done on said section of road, shall be forfeited by the said party of the first part, and become the right and property of the said party of the second part; and further that the said Company shall be at liberty, and have full right and authority, any thing herein contained, to the contrary notwithstanding, to employ and set to work, or contract with, any person or persons whomsoever, in the place and stead of the said party of the first part, and without any interruption or interference from the said party of the first part, or his heirs, executors or administrators.

In witness whereof, the said Caspar W. Wever, for and in behalf of the aforesaid Baltimore and Ohio Rail-road Company, hath hereunto subscribed his name and affixed his seal of office, and the said hath hereunto set his hand and seal the day and year first herein before written.

Signed, Sealed and Delivered in the presence of

SEAL.
SEAL.

R. (See Nar. p. p. 52, 55, 99, 140, &c.)

Articles of agreement, made and concluded this day of in the year of our Lord, one thousand eight hundred and twenty between on the first part, and CASPAR W. WEVER, Superintendent of the Baltimore and Ohio Rail-road, in behalf of the Baltimore and Ohio Rail-road Company, of the second part:—

Whereas the aforesaid party of the first part, hath agreed for and in consideration of the payments hereinafter mentioned, to

build and complete in a mechanical and workmanlike manner, all such arched bridges, gothic and common culverts and walls, which may, in the opinion of the superintendent, be necessary on section, of the said road, and which masonry thus contracted for by the said party of the first part, shall be built in the most strong and substantial manner,—the foundations to be of such lengths and depth, and secured in such manner as the superintendent may direct. The walls of the abutments, piers, wings and parapets of the bridges, and the walls of the culverts and other walls, to be of such length, height and thickness, and to conform to such slope as the superintendent may prescribe. The arch or arches to be composed of stone, dressed to such uniform and regular thickness and length, as the superintendent may direct, and of such slope that the sides shall range with, or form radii, of the circle of which the arch may be a segment, and to be so laid and fitted, that each range of stone may form, from side to side of the arch, a regular line or tier with its correspondent exterior or ring stones, and that each stone may break a joint of the preceding range or tier. The parapet walls to be copped their entire length with stone shaped to such form, and to be of such size as the superintendent may approve. Such part or portion of the masonry to be DRY, as the superintendent may designate, and the balance laid in mortar, to be composed of such sand and lime, and mixed in such proportions, as the superintendent may approve. No stone to be used but such as shall have been approved by the superintendent. Such part of the masonry as the superintendent may require, to be grouted and pointed in such manner as the superintendent may direct.

The said party of the first part, shall not let or transfer his contract, or any part thereof, to any other person, without the consent of the superintendent; and shall personally superintend the construction of the masonry hereby contracted for. The said party of the first part, shall not employ any mechanics, workmen, or laborers, who commit depredations upon the neighborhood, or insult travellers or other persons, or who have been discharged by any other contractor on said road, for riotous or improper conduct, and he shall, upon application of the superintendent, immediately discharge any mechanic, workman, or laborer, from his employment.

Now this agreement, made and concluded on the day of in the year of our Lord one thousand eight hundred and twenty between of county, in the state of of the first part, and Caspar W. Wever, superintendent of the Balti-

more and Ohio Rail-road Company, for and on behalf of the Baltimore and Ohio Rail-road Company of the second part, Witnesseth, That the said party of the first part, for himself, his heirs, executors and administrators, doth hereby covenant, promise and agree to and with the said Caspar W. Wever, superintendent as aforesaid, that he the said party of the first part, shall and will, well and faithfully, in a mechanical and workmanlike manner, on or before the day of in the year 182 , build, finish and complete in the manner and on the conditions herein before mentioned, all such bridges, gothic and common culverts and detached walls as the superintendent may direct, on the aforesaid section of road: that is to say, the gothic and common culverts and detached walls on or before the day of 182 ; all circular arched bridges of and under twelve feet chord on or before the day of 182 ; and all bridges of a chord over twelve feet, on or before the day of 182 . And the said party of the first part shall remove all such earth, stone, sand, gravel, timber, or other material which, in the opinion of the superintendent, obstruct the free passage of the water to, under and from such bridges and culverts as may be built in pursuance of these articles of agreement.

In condition whereof, the said Caspar W. Wever, superintendent as aforesaid, for and in behalf of the Baltimore and Ohio Rail-road Company, doth hereby covenant, promise and agree to and with the said party of the first part, his heirs, executors and administrators, that the said Company, by their superintendent, shall and will, for doing and performing the work aforesaid, well and truly pay to the said party of the first part, his heirs, executors or administrators, at the rate of dollars and cents, for each and every perch of twenty-five cubic feet which arched bridges of a chord over twelve feet may contain, at the rate of dollars and cents for each and every perch which arched bridges of a chord of and under twelve feet may contain, at the rate of dollars and cents for each and every perch which all gothic and common culverts and detached walls may contain, The whole to be measured by the superintendent for the time being, whose measurement shall be final and conclusive. Payment to be made in the following manner:—that is to say—Each and every month during the progress of the work, the said Company will pay three-fourths of the relative value of the work done, to be judged of by the superintendent, until the whole of the masonry hereby contracted for, shall have been finished and completed agreeably to contract, and shall have been accepted by the superintendent as so finished and comple-

ted, when the balance unpaid shall forthwith be paid to the said party of the first part, his heirs, executors or administrators.

The said party of the first part, shall have right and privilege to quarry stone for the masonry hereby contracted for, on any part of the line of said road and haul the same or any other stone over such parts of said road as may be levelled, provided he does not damage said road. In case the said party of the first part, shall damage said road, by quarrying stone therein or hauling over the same, he shall be charged with such amount of money as the superintendent may assess.

And the said party of the first part, for himself, his heirs, executors and administrators, further covenants and agrees with the said Caspar W. Wever, superintendent as aforesaid, that in case the said party of the first part shall not well and truly from time to time comply with and perform all the covenants herein before stated, and stipulated on his part to be done, performed and complied with, in the manner and form, and within the time herein before specified,—or in case it should appear to the superintendent of the road for the time being, that the work does not progress or go on with sufficient speed,—or in case the workmanship shall not be approved by the superintendent,—or in case the work shall not be commenced within the time or at the place required by the superintendent,—or in case the superintendent shall believe that the good of the work will be advanced by the dismissal of the said party of the first part, the superintendent may accordingly dismiss him, and that then and in that event, the foregoing agreements on the part of the Baltimore and Ohio Rail-road Company, and every part and clause thereof, shall become null and void, and the unpaid one-fourth part shall be forfeited by the said party of the first part, to the use of the said Company,—and the said Company shall be at liberty and have full right and authority, any thing herein contained to the contrary notwithstanding, to employ and set to work, or contract with any person or persons in the place and stead of the said party of the first part, and without any interruption or interference from the said party of the first part, his heirs, executors or administrators.

In witness whereof, the said Caspar W. Wever, superintendent as aforesaid, acting for and in behalf of the Baltimore and Ohio Rail-road Company, hath hereunto set his hand and affixed his seal of office, and the said hath hereunto set his hand and seal the day and year first herein before written.

Signed, Sealed and Delivered in the presence of

SEAL.

SEAL.

S. (See Nar. p. 58.)

SIR.—The Board of Engineers of the Baltimore and Ohio Rail-road Company, have authorised the survey of a route for the Rail-road, commencing at Grimes' spring, and leading downward along the Linganore, or Ben's branch, one of its tributaries, crossing the Monocacy at or near the mouth of the Linganore, and passing in the vicinity of Fredericktown, and thence by the most favourable ground to the Point of Rocks.

The execution of this service is entrusted to yourself and the officers on duty with you.

In the performance of this duty, you will be regulated by the following instructions, viz:

Descend from Grimes' spring, or the level of the summit in its vicinity by an inclined plane, at an angle not exceeding three degrees. Thence by the valley of Linganore or Ben's branch, to the confluence of the streams just mentioned, thence by the valley of the former to the Monocacy, and thence crossing the Monocacy at any convenient elevation beyond the reach of the highest freshets, by the most favourable grounds to the Point of Rocks.

Instead of the system of inclined planes, contemplated in the instructions of the Board under which you have been acting, a gradual descent along the vallies of the stream, not exceeding thirty feet per mile is now to be aimed at. And instead of crossing the Monocacy at a high elevation, in order to maintain a level, thence to the valley of the Potomac; a gradual ascent not exceeding twenty feet per mile, is admissable, from the crossing of the Monocacy to the summit between Fredericktown and the Point of Rocks.

Having accomplished the survey just considered, you will diverge therefrom at any suitable point, and run a line of level, or descents, to the mouth of Bush creek, and having crossed the Monocacy at a suitable elevation, and at the most favourable point, you will survey the immediate valley of Bush creek, on the plan suggested in this communication, in reference to the valley of the Linganore.

By order of the Board of Engineers,

Signed, S. H. LONG, Bt. Lt. Col.

Lt. WALTER GWYNN, on top'l. duty, Grimes' Spring.

August 18*th*, 1828.

T. (See Nar. p. p. 58–60.)

Sir.—You will, when the field operations of your party are completed between the city of Baltimore and the Frederick road, at Ellicott's mills on the Patapsco, proceed with the location of the Rail-road up the valley of that stream with an ascent as gentle and gradual as the circumstances of the ground and the fall in the stream will permit, having proper regard to expense, curvature and stability. In no case descend, and in no case rise more than at the rate of thirty feet per mile. It is desirable that the rise shall not any where be greater than twenty feet per mile.

You will, so far as they may be applicable, apply the principles and directions contained in your instructions of the 9th of July last, to that part of the route now contemplated.

Full reliance is placed on your knowledge and judgement, to supply any deficiency in the instructions so as to make the best location which circumstances will permit.

Signed, S. H. LONG, J. KNIGHT, } Of the Board of Engineers.

Capt. Wm. G. McNeill.

August 25th, 1828.

9.	56,399 cub. yds. emb't.	20	11,279 80	20	11,279 80	27½	15,102	The cost of a Wooden Viaduct across Warfields lane as originally contemplated, would be the same as that of an embankment of equal length.
	113 perches masonry.	2 00	226	2 75	310 75		4'422 81	
	Total for Sec. No. 9.		11,505 80		11,590 55		19,524 81	
10.	52,287 cub. yds. emb't	16	8365 92	18	9411 66	32	71,472	Sections 9 and 10 embrace the high embankment at Gadsby's run, &c. Change made in the location. Stone bridge and embankment substituted for Wooden Viaduct. Grading not completed
	Wooden Viaduct.		15000		15000			
	277.5 perches masonry.	2 00	555	3 25	901 90		38,919 61	
	Total for Sec. No. 10		23,920 92		25,313 56		110,391 61	
11.	11,217 cub. yds. emb't.	12½	1402 15		1450		1600	Change made in the location.
	45.25 perches masonry.	2 00	90 50	2 75	124 43		140 95	
	Total for Sec. No. 11.		1492 65		1574 43		1740 95	
12.	[illegible] Poles.	35	3062 50		3062 50		1944 19	Stone culverts and embankments substituted for Wooden Viaduct, at the crossing of Still House Run.
	Wooden Viaduct.		5000 00		5000 00		12,947 00	
	Total for Sec. No. 12.		8062 50		8062 50		14,891 19	
13.	151.5 Poles.	30	4545	45	6817 50	45 73	6928 00	Stone convenient.
	401 perches masonry.	1 25	501 25	2 50	1002 50	2 90	1162 90	
	Total for Sec. No. 13.		5046 25		7820 00		8090 90	

14.	6,445 cub. yds. emb't.	13	837 85	15½	1000	18	1160 15	Stone convenient.
	165 perches masonry.	1 25	207 50	2 50	415	2 50	415	
	Total for Sec. No. 14.		1045 35		1415 00		1575 15	
15.	180.6 Poles.	16	2889 60	16	2889 60		5507	Including valley of Dorsey's Run.
	Wooden Viaduct.		3000 00		3000		11,000	Stone Bridge substituted for Wooden Viaduct.
	185.5 perches masonry.	1 25	918 37	1 50	263 25	2 00	350	
	Total for Sec. No. 15.		6107 97		6152 85		16,857 00	
16.	66.5 Poles.	16	1064	16	665		665	Stone convenient.
	20 perches masonry.	1 25	25	1 75	35	1 75	35	
	Total for Sec. No. 16.		1089 00		700 00		700 00	
17.	145,5 Poles.	25	3637 50	25	3637 50		3637 50	Stone convenient.
	1850 perches masonry.	2 00	3700	3	5550	3 40	6475	
	Total for Sec. No. 17.		7337 50		9187 50		10,112 50	
18.	151.5 Poles.	21	3181 50	27 50	4166 25	37 50	5682 40	Sections 18, 19. and 20, were completed at the average price of $37 50 per Pole. Stone at hand.
	275.75 perch's masonry	1 25	469 70	1 50	563 62	1 69	634 8	
	Total for Sec. No. 18.		3651 20		4729 87		6316 48	

19.	133.5 Poles 2,600 perches masonry Total for Sec. No. 19.	21 2	2803 50 5200 8003 50	27 50 3	3671 25 7800 11,471 25	37 50 3 21	5006 50 8350 13,356 50	Sections 18, 19, and 20, were completed at the average price of 37 50 per Pole. Stone at hand.
20.	133.5 Poles. 337,5 perches masonry. Total for Sec. 20.	21 1 25	2803 50 421 56 3225 06	27 50 1 75	3671 25 590 18 4261 43	37 50 1 75	5006 50 590 18 5596 68	Do. do. do.
21.	103 Poles. Wooden Bridge. Total for Sec. No. 21.	35	3605 4500 8105 00	50	5150 4500 9650 00		6180 35,000 41,180 00	At the crossing of the Patapsco. Stone bridge substituted for a WoodenViaduct. SeeNar p.177. Actual cost uncertain.
22.	151.5 Poles. 161 perches masonry. Total for Sec. No. 22.	7 50 1 25	1136 25 201 25 1337 50	11 50 1 25	1741 25 201 25 1942 50	12 18 1 82	1893 85 293 75 2187 60	Stone at hand.
23.	133 Poles. 165 perches masonry. Total for Sec. No. 23.	7 50 1 25	997 50 206 25 1203 75	9 50 1 25	1263 50 206 25 1469 75	10 50 1 75	1396 50 288 75 1685 25	Masonry omitted in original estimate.

24.	139 Poles.	7 50	1042 50	9 50	1320 50	10	1390 00	
	271.25 perches masonry	1 25	339 06	1 25	339 06	1 75	474 69	Stone at hand.
	Total for Sec. No. 24.		1381 56		1659 56		1864 69	
25.	157.5 Poles.	10	1575 00	11 50	1811 25	12 50	1968 25	
	116.75 perches masonry	1 25	145 93	1 25	145 93	1 75	204 31	Stone at hand.
	Total for Sec. No. 25.		1720 93		1957 18		2172 56	
26.	60.5 Poles.	10	605	50	3025		3025	At Ellicotts Mills.
	550 perches masonry.	1	550	1 25	687 50		687 50	Actual cost of Grading uncertain.
	Wooden Viaduct, &c.		3000		3000		3000	This item was omitted in the original estimate. Viaduct not yet constructed.
	Total for Sec. No. 26.		4155 00		6712 50		6712 50	
	Total amounts.		200,997 37		262,087 05		531,698 46	
	Average cost per mile of the 1st Divison of the Baltimore and Ohio Rail-road for Grading and Bridging.		17,108 42		22,419 77		45,483 18	The last column exhibits the cost known to have been incurred on the 1st. Division of the Rail-road.

Note. Persons who have had any experience in works of this kind, and especially competent judges of the cost of Masonry, will be able to decide on the adequacy of the prices exhibited in the second column of this Synopsis, headed "Corrected Estimate," &c.

19.	133.5 Poles 2,600 perches masonry Total for Sec. No. 19.	21 2	2803 50 5200 8003 50	27 50 3	3671 25 7800 11,471 25	37 50 3 21	5006 50 8350 13,356 50	Sections 18, 19, and 20, were completed at the average price of 37 50 per Pole. Stone at hand.
20.	133.5 Poles. 337,5 perches masonry. Total for Sec. 20.	21 1 25	2803 50 421 56 3225 06	27 50 1 75	3671 25 590 18 4261 43	37 50 1 75	5006 50 590 18 5596 68	Do. do. do.
21.	103 Poles. Wooden Bridge. Total for Sec. No. 21.	35	3605 4500 8105 00	50	5150 4500 9650 00		6180 35,000 41,180 00	At the crossing of the Patapsco. Stone bridge substituted for a Wooden Viaduct. See Nar p. 177. Actual cost uncertain.
22.	151.5 Poles. 161 perches masonry. Total for Sec. No. 22.	7 50 1 25	1136 25 201 25 1337 50	11 50 1 25	1741 25 201 25 1942 50	12 18 1 82	1893 85 293 75 2187 60	Stone at hand.
23.	133 Poles. 165 perches masonry. Total for Sec. No. 23.	7 50 1 25	997 50 206 25 1203 75	9 50 1 25	1263 50 206 25 1469 75	10 50 1 75	1396 50 288 75 1685 25	Masonry omitted in original estimate.

24.	139 Poles.	7 50	1042 50	9 50	1320 50	10	1390 00	
	271.25 perches masonry	1 25	339 06	1 25	339 06	1 75	474 69	Stone at hand.
	Total for Sec. No. 24.		1381 56		1659 56		1864 69	
25.	157.5 Poles.	10	1575 00	11 50	1811 25	12 50	1968 25	
	116.75 perches masonry	1 25	145 93	1 25	145 93	1 75	204 31	Stone at hand.
	Total for Sec. No. 25.		1720 93		1957 18		2172 56	
26.	60.5 Poles.	10	605	50	3025		3025	At Ellicotts Mills.
	550 perches masonry.	1	550	1 25	687 50		687 50	Actual cost of Grading uncertain.
	Wooden Viaduct, &c.		3000		3000		3000	This item was omitted in the original estimate. Viaduct not yet constructed.
	Total for Sec. No. 26.		4155 00		6712 50		6712 50	
	Total amounts.		200,997 37		262,087 05		531,698 46	
	Average cost per mile of the 1st Divison of the Baltimore and Ohio Rail-road for Grading and Bridging.		17,108 42		22,419 77		45,483 18	The last column exhibits the cost known to have been incurred on the 1st. Division of the Rail-road.

Note. Persons who have had any experience in works of this kind, and especially competent judges of the cost of Masonry, will be able to decide on the adequacy of the prices exhibited in the second column of this Synopsis, headed "Corrected Estimate," &c.

X. (See Nar. p. 73.)

September 30th, 1828.

Sir,—In making a comparison between the cost of Wooden Bridges and Stone Bridges on the Baltimore and Ohio Rail-road, between this and the Patapsco, the following sums should be added to the cost of Stone Bridges, viz: At Gwynn's Falls, where the length of a Wooden Bridge would be about two hundred feet, should a Stone Bridge be adopted, the additional embankment on the line would be 1697 cubic yards, at fourteen cents = $237.58. At Gadsby's Run where the length of a Wooden Bridge would be 1000 feet. If a Stone Bridge be adopted, the additional embankment would be 171,839 cubic yards at 20 cents = $34,367.80, and at Still House Run, where the length of a Wooden Bridge would be about 333⅓ feet, the additional embankment, should a Stone Bridge be adopted, would be 43,318 cubic yards at 27 cents, = $11,695.86.

Respectfully submitted,

Signed JOHN N. DILAHUNTY.

To Lt. Col. Long, Board of Engineers.

P. S. *Estimated for Stone Bridges.*

1st. Across Gwynn's falls, 3251 perches, at $3.25 per perch,	$10,566.50
Add for Embankment as above	237.58
Total	$10,894.08
2d. Across Gadsby's Run 3,411 perches at $4 per perch	$13,644.00
Add for Embankment	34,367.80
Total	$48,011.80
3d. Across Still House Run 1,783½ perches, at $4 per perch	$ 7,134.00
Add for Embankment	11,695.86
Total	$18,829.86

Estimated price of Wooden Bridges.

1st.	Across Gwynn's Falls, length	200 feet, at	$15	$ 3,000.00
2d.	Ditto Gadsby's Run	1000 "	"	15,000.00
3d.	Ditto Still House Run	333⅓ "	"	5,000.00

COMPARISON.

	Stone Br.	Wooden Br.	Difference.
Gwynn's falls, - - -	$10804.08	$ 3000.00	$ 7804.08
Gadsby's run, - - - -	48011.80	15000.00	33011.80
Still House run, - - -	18829.86	5000.00	13829.86
Total Difference			$54645.74

Y. (See Nar. p. 78, 82, 96.)

October 13*th*, 1828.

Resolved, that the ground at the "Point of Rocks" be immediately staked out for the Rail-road, and put under contract as soon as practicable, and that Col. Long be charged with this duty. In relation to the first crossing of the Washington turnpike road, it was

Resolved, as the opinion of this board, that it is expedient to construct a tunnel under the said turnpike road at the place of first crossing the same with the Rail-road, and that the tunnel be not more than three hundred feet in length.

Col. Long verbally communicated that the surveys herotofore authorized by this Board between the Monocacy and the "Point of Rocks," are now completed, and that the party that were engaged therein, are now ready for further instructions. Col. Long is requested to take measures to employ the said party on the duty entrusted to his direction, by a resolution of this date, and such other service as he may assign to them.

The President stated that it had been suggested to him whether a regard to economy might not justify a deviation from the plan of construction as heretofore recommended by the Board of Engineers, by altering the graduation of the fourth and fifth sections, so as to leave an elevation of nine feet on the highest part of the road at that place, instead of preserving a *dead* level as had been agreed upon. The subject was referred to Col. Long, J. Knight and Capt. McNeill, with directions carefully to consider this part of the location, and report their opinion thereon.

Z. (See Nar. p. 79 to 82, &c.)

Capt. McNeill submitted a report on the location of the Rail-road, which had been completed to the forks of Patapsco, of which the following is a copy.

Gentlemen,—I have the honour to report that the location of the Rail-road assigned to my direction (under the supervision of the Board of Engineers) by your instructions, dated August 25, 1828, has been effected to the forks of the Patapsco, or for a distance of about eleven and three quarter miles beyond Ellicott's mills. Lieuts. Cook and Hazzard have been directed to commence a revision of the same, and to await such further instructions as may be issued by the Board of Engineers. Reference is respectfully made to the field notes of those gentlemen, and to the maps and profiles which will have been made by them in illustration of the surveys in which they have been engaged.

Lieut. Dillahunty has been instructed to report the results of his operations, in relation to construction, to the Superintendent, and to attend to the execution of such other duties as may be assigned him. Signed, WM. G. McNEILL,

Capt. Topographical Engineers, and member of the Board of Engineers.

To the Board of Engineers of the Baltimore and Ohio Rail Road.

October 20, 1828.

Lieut. Col. Long reported verbally, that in conformity to a resolution of the Board at their last meeting, he had personally examined the country at and in the vicinity of the "Point of Rocks," and had directedthe definitive location of the route of the Rail-road from the vicinity of Chapel ridge to a point on the northern shore of the Potomac river, about two and a quarter miles above the "lower Point of Rocks," to be made with all practicable despatch by Lieuts. Gwynn, Trimble and Thompson, and had issued instructions for their guidance, as follows:

Sir.—The officers attached to my brigade, consisting of yourself, Lieuts. Trimble and Thompson, will forthwith engage in the demarcation of the route for the Rail-road, commencing at the lower Point of Rocks, and extending upward along the margin of the Potomac, to the lower extremity of Hook's bottom—and in the location of the road, commencing at the point first mentioned and extending eastwardly by the most practicable route, to a point in the vicinity of Chapel ridge, but at such a distance westwardly thereof, that the embankment between the extremity of the location or the point just mentioned may be equal to the excavation necessary to the passage of at least half or two thirds of the distance through said ridge.

The results afforded by the surveys made under your superintendence, induce the belief, that the level proper to be sustain-

ed in the immediate valley of the Potomac, is at an elevation of about twenty-five feet above low water mark of that river; that this level may be pursued to the distance of about half a mile from the Point of Rocks in a south-easterly direction; that an assent of about seventy-eight feet above the level just mentioned, then becomes necessary, in order to arrive at the elevation best adapted to the natural surface of the ground in the vicinity of the most favourable route for a level road leading from the Point of Rocks, to the point already designated, as the termination of the location here contemplated.

Accordingly, it now becomes the duty of yourself and the officers associated with you, to trace with the utmost care and precision, the route above pointed out, and to effect a definitive location of the Rail-road thereon, in conformity to the levels above mentioned, and to effect a transition from the lower to the upper level here contemplated, by means of an inclined plane at a grade not exceeding three degrees or an inclination of two hundred and seventy-six feet per mile.

In tracing the route, you will cause a series of stakes and level pegs to be set in the ground, at intervals of one hundred feet between every two adjacent stakes, and the series thus set will be regarded as indicating the centre of the Rail-road. These stakes will be designated by numbers indicating the stations, and underneath the numbers will be marked, the depth of cutting, and the height of embankment, as the case may be, and on their reverse or opposite side will be marked the angle of deflection, where the route is curved, or with the letter T. where the route is direct. In cases where the route deviates from a right line, additional stakes will be set at points midway between the stakes above mentioned, at a distance equal to the length of the primary versed sine corresponding to the angle of deflection by which the curve is run, and in a direction perpendicular to the line joining the stakes above mentioned. The stakes here considered are to be marked with the letter V. only.

Bench marks will be made in the vicinity of the route, but not immediately upon it, at intervals not exceeding four or five hundred yards, and designated by appropriate marks.

Care will be taken to effect such a location along the whole line, that the excavation and embankment may be equal to each other, and the least possible, due regard being paid to the reduction of distances.

In level ground it will be desirable to have the surface of the road elevated about one foot above the natural surface of the ground; and in such cases the road bed will be formed by earth

excavated from side drains, and the stone covering necessary for the protection of the road.

In all surveys for a definitive location, care must be taken to avoid curvatures as much as possible, and in cases where they cannot be avoided, they should be as gentle as the nature of the ground will permit.

The route along the valley of the Potomac at the passage of the "Point of Rocks," will be moreover defined by stakes set opposite to those indicating the centre of the road, and at the transverse distance of thirteen feet therefrom, thus indicating the lines by which the surface of the road-bed is to be bounded.

Other instructions predicated on the principles that ought to govern in the location of a Rail-road, having been furnished for your guidance on former occasions, preclude the necessity of a more minute exposition of the rules that should be observed in the service now assigned to the party under your direction.

Signed, S. H. LONG, Bvt. Lieut. Col.

Lieut. WALTER GWYNN.

October 20th, 1828.

Resolved, that the Board take measures to put under contract for grading and masonry, that portion of the Rail-road embraced in the location referred to in the foregoing report of Col. Long, situated between the point proposed as the western termination of the inclined plane, near the "lower Point of Rocks and Hook's bottom, above the upper "Point of Rocks."

Resolved, as the opinion of this Board, that it is expedient to erect wooden viaducts across Gwynn's falls, Gadsby's run, the Patapsco at Pierpont's rocks, and the Fredericktown turnpike road near Ellicott's mills, in preference to stone bridges, and that the necessary measures be taken accordingly.

Whereas, by a resolution of the Directors of the Baltimore and Ohio Rail-road Company, Jonathan Knight and Capt. McNeill, two of the members of this Board have been appointed to visit England, and are now about to depart on the service assigned them.

Therefore Resolved, that in the absence of these members all the powers of this Board be vested in, and shall be executed by Col. Stephen H. Long and Philip E. Thomas, the two members remaining in this country.

Philip E. Thomas having resigned the appointment of President of this Board, Resolved unanimously, that Col. S. H. Long be and he is hereby appointed President of the Board of Engineers.

A. 1. (See Nar. p. 80.)

To the Board of Engineers of the Baltimore and Ohio Rail-road.

The undersigned, members of the Board of Engineers, to whom was referred on the 13th inst. the subject of "altering the graduation of the fourth and fifth sections, so as to leave an elevation of nine feet on the highest part of the road at that place, instead of preserving a dead level as had been agreed upon," having given to the subject their consideration, are of opinion, that no change in the original plan ought now to be admitted, nor should any change be hereafter made as suggested, unless unforeseen difficulties should arise in the further prosecution of the excavation.

The only reason urged for the change, is a saving of expense in the construction, but taking into view the quantity of labour already performed in pursuance of the original plan, the saving could not be more than four or five thousand dollars, which we are confident, would by no means justify the interruption of the projected level from Baltimore to the Patapsco. The reason would be equally strong to derange the whole projected level, and convert it into an undulating surface of more or less acclivity, which would have the effect virtually to lengthen the line, and beside destroying the symmetry of the plan of the road, would depreciate its relative value beyond the amount which would be saved by the change.

S. H. LONG,
J. KNIGHT,
WM. G. McNEILL,
} Committee of the Board of Engineers.

October 21*st*, 1828.

B. 1. (See Nar. p. 81.)

October 24*th*, 1828.

In conformity to a request from the President and Directors of the Rail-road Company, the following topics were propounded by Col. Long, for the purpose of suggesting to the gentlemen of the mission, a variety of objects worthy of their attention and inquiry.

The topics were presented in the form of queries, and arranged under separate heads, in the following order, viz:

I. GENERAL HEAD.

Varieties in the natural structure and surface of the ground, and their adaptation to the purposes of a Rail-road.

QUERIES.

1st. Particular aspect of the country traversed by the several Rail-roads in England, Scotland, Ireland and Wales?

2d. Geological characters of the same, so far as they may be indicative of its structure at the surface?

3d. Soil, mineral and vegetable productions of the same?

4th. The nature of the surface with respect to its adaptation to the permanent support of a Rail-road?

5th. Peculiarities in the structure unfavourable for Rail-roads, and those that are most favourable?

6th. The exposure, whether east, west, north or south, most favourable to the stability and permanency of a Rail-road, and the reasons of it?

7th. The extremes of Heat and Cold, and the effects produced upon Rail-roads by changes of temperature?

8th. The effects produced by extreme moisture or dryness? and the state of the weather most conducive to freedom of travel and transportation upon Rail-roads?

9th. The obstructions occasioned by frost, or snow? &c. &c.

II. GENERAL HEAD.

The principles that ought to govern in the survey and location of a Rail-road intended for a reciprocal traffic.

QUERIES.

1st. The most approved mode of executing surveys for Rail-roads, in England, Ireland, Scotland and Wales?

2d. The curvatures or deviations from right lines, deemed admissable in those countries?

3d. The deviations from a level that may be incurred without the intervention of inclined planes?

4th. The greatest inclination allowable for an inclined plane? and the inclination best adapted to a *reciprocal trade*, where inclined planes are unavoidable?

5th. The greatest inclination at which the adhesion of the wheels to the rails, is sufficient to prevent their slipping, in the worst state of the weather, frost and snow excepted?

6th. The proportion between the friction upon a direct, and that upon a curved rail-way of a given curvature? Also the pro-

portion between the friction as first indicated and that on roads of different curvatures?

7th. Examples of deviations from a true level, on Rail-roads for reciprocal trade, in situations where inclined planes were not deemed necessary?

8th. Examples of inclinations of inclined planes, on different Rail-ways for reciprocal trade?

9th. Examples of curvatures on different Rail-ways? and any facts illustrative of the disadvantages attending curvatures upon Rail-ways.

10th. Greatest angle of deflection admissable between any two contiguous right lines of a continuous Rail-way?

11th. Turns-out, whether effected by means of curves or right lines? If by means of the former, by what radius of curvature? And if by the latter, by what angle of deflection?

12th. What depth of cutting may be encountered, in order to save a given horizontal distance, say one mile?

13th. At what depth below the summit of a hill, does a tunnel prove more economical, than an open cut?

14th. The most approved dimensions for a tunnel for the passage of a locomotive engine?

15th. The most approved dimensions of a Rail-way with double tracks?

16th. Examples of Rail-roads of different dimensions?

17th. Best length for sidelings?

18th. Number of sidelings per mile, whether double or single?

19th. Examples of curves in deep *cuts*, tunnels, or embankments?

20th. Method of tracing curves.

21st. Method of tracing inclined planes?

22d. Are curvatures admissable in inclined planes? any objections to which they are liable?

III. GENERAL HEAD.

The various modes of construction and their adaptation to the various conditions of the natural surface.

Queries.

1st. Manner of forming the road-bed generally?

2d. Side-walls? their slopes? manner of construction? dimensions? in what situations necessary?

3d. Bridges, culverts, transverse drains? dimensions of their abutments, their chords and arcs? situations, &c. where dry or wet walls are respectively preferable?

4th. Mode of setting piles? in what localities are they necessary? mode of constructing cribs, or timber foundations? and in what situations are they necessary?

5th. Mode of protecting the bed of the road from demolition by atmospheric agents of various kinds? mode of securing the slopes of banks, drains, &c. from washing?

6th. Machinery proper to be employed in the construction of viaducts, bridges, &c.?

7th. Comparative cost and efficiency of wooden and stone viaducts?

8th. Delineations illustrative of the most approved plans of constructing bridges and viaducts?

9th. Mode of constructing and adjusting sidelings, &c.?

10th. Delineations illustrative of the forms, dimensions and construction of the tools, machinery, and apparatus of all descriptions, found most useful in the construction of Rail-roads?

11th. The appropriate slopes for banks in different kinds of soil, rocks, &c., also the slopes best adapted to walls intended for the support of earthen embankments?

12th. The dimensions, and mode of constructing tunnels for Rail-roads? the mode of constructing centerings, &c. for tunnels?

13th. Delineations illustrative of tunnels, and the apparatus necessary for their construction?

14th. The various forms and dimensions of rails, their weight &c.? the mode of adjusting and fastening them? the size of the rivets, nails &c. by which they are confined, and in particular the appropriate fastenings and other adjustments for plate rails, such as are contemplated for the Baltimore and Ohio Rail-road?

15th. The various modes of passage for roads leading across a Rail-road, whether by means of arches, level passes or bridges?

16th. The dimensions of wooden rails? the manner of adjusting them? their durability? the best mode of applying wrought iron plate rails to them?

17th. The same queries in reference to stone rails plated with iron?

18th. The defects discoverable in the construction of Rail-roads, and their several appendages to be particularly noticed?

19th. The comparative elevation of the interior and exterior rails of a rail track, adapted to curves of different flexures?

20th. The mode of preparing the most durable groute, mortar and cements, and of applying them? a cheap, substantial and durable cement applicable in laying iron plates upon stone rails?

IV. GENERAL HEAD.

Motive power, and its various modes of application, considered in reference to their economy and efficiency.

Queries.

1st. The comparative strength of horses and mules? and their respective efficiency?

2d. Steam power? its economy compared with that of animal labour? number of cubic feet of steam, of different densities or pressures, equivalent to the average power of a horse?

3d. Cost and description of apparatus necessary in the application of animal power.

4th. Cost and description of the most approved locomotive engine?

5th. Drawings and descriptions illustrative of improvements made in the locomotive engine, within the last three years?

6th. Mode of supplying locomotive engines with fuel and water?

7th. Repairs, adjustments, greasing, &c. requisite, in the management and continued operation of a locomotive engine? and the frequency of them respectively?

8th. Whether animal power can be applied to greater advantage, in the ascent of an inclined plane, by means of a gin at its summit, or by direct draft upon the carriage?

9th. Whether a locomotive engine may not be employed in a manner partaking of the locomotion of the load on a level road, and being detached from its load, perform the office of a stationary engine, at the head of an inclined plane?

10th. The speed in miles per hour at which carriages move on different Rail-ways.

11th. The ill effects resulting to the rails, &c. from rapid movements upon Rail-roads?

12th. The injury sustained by the rails from the use of locomotive engines and the reasons (if such be the case) why the injury thus sustained is greater than that resulting from the application of animal power the speed being the same?

13th. The mode of applying water power, and the advantage resulting therefrom?

14th. The inclination of a plane at which the gravity of the load in the direction of the plane is sufficient to overcome the friction of the carriages?

15th. Examples showing the friction upon different Rail-ways? and the reasons of the difference in the friction upon them if any?

16th. Examples of the excess of friction upon curves, over that upon straight roads? and of the augmentation of the power required in order to pass upon them?

17th. The injuries likely to result from rapid movements upon curved roads, and the mode of obviating them?

18th. Examples showing the power of a locomotive engine moving with different degrees of speed?

19th. Examples showing the power of a horse moving with different degrees of speed?

V. GENERAL HEAD.

Examples illustrative of the economy and efficiency of Rail-roads, under a variety of circumstances.

Queries.

1st. The prime cost per mile of different Rail-ways intended for reciprocal traffic?

2d. Annual cost of renewals and repairs of different Rail-ways?

3d. Cost of transportation per ton per mile, on the same Rail-ways?

4th. Amount of elevations surmounted by them?

5th. Rates of toll chargeable upon them?

6th. The same queries in relation to rail-ways, intended for a traffic in one direction only?

7th. The comparative advantages of Rail-roads, on which a descending load drags up the empty carriages, and those on which horses are employed to return the carriages?

8th. Examples of Rail-roads, whose stock has proved unproductive? and the reasons of it?

9th. Examples of profitable Rail-roads, and the rates per cent. at which they have been productive?

VI. GENERAL HEAD.

Examples of the comparative efficiency of the most improved Rail-roads, canals, and Turnpike roads.

Queries.

1st. Actual cost per mile for transportation on different Canals, Rail-roads, and Turnpikes?

2d. The rate of speed at which it is effected upon them respectively.

3d. The comparative risk attendant upon these several modes of transportation?

4th. The comparative ease and despatch of personal travelling upon them?

5th. Examples of the cost of construction, on equal distances upon Rail-roads, Canals and Turnpikes? also, of the cost of repairs on each respectively?

6th. The comparative annual duration of travel and transportation on Rail-roads and Canals?

VII. GENERAL HEAD.

Most approved modes of construction for Locomotive Engines, and Rail-road carriages of all descriptions, together with a particular account of the materials best adapted to these purposes.

Queries.

1st. A drawing and description of the most approved locomotive engine? and of its several component parts?

2d. An explanation of the advantages resulting from any peculiarities in its construction?

3d. The density or pressure of the steam maintained during its operation?

4th. The capacity of its boiler? the quantity of water contained in it? the surface exposed to the action of the heat? the mode of preventing the escape of heat from the exterior of the boiler? the mode of injecting and ejecting steam from the working cylinders? the advantages or disadvantages of passing steam into the chimney? and the reasons of them? the capacities, or dimensions of the steam cylinder, steam conductors, &c. &c.?

5th. A drawing and description of the best constructed water car and fuel carriage? also of the conduit pipe or hose, through which the water is conveyed to the boiler? and of the implements employed in tending the fires, &c.?

6th. A drawing and description 1st of a coal carriage? 2d of a carriage for the transportation of merchandize? 3d of the best constructed carriage for the conveyance of passengers? 4th of a lumber car? 5th of a pleasure carriage?

7th. A drawing and description of a carriage wheel of the most approved construction? its dimensions? manner of construction? weight, cost, durability, &c.?

8th. The dimensions and mode of preparing and adjusting the axles? the mode of constructing and adjusting their bearings? the materials of which the latter are composed?

9th. The adjustment of the wheels to their axles? whether the former are allowed to traverse upon the latter? any objections to such an arrangement?

10th. The objections if any, to wooden wheels with rims of cast iron?

11th. The description and consistency, or texture of the metals proper to be employed in the construction of the various parts of a carriage?

12th. The mode of constructing and applying brakes or convoys attached to carriages and intended to regulate their speed in the descent of inclined roads? the adjustments requisite to an easy and efficient management of them?

13th. Any defects observable in the construction of carriages, &c. to be particularly noticed, and the nature and tendency of them explained?

14th. The respective weights, cost and durability of the several carriages mentioned under this head? also the cost of the other several items here enumerated?

VIII. GENERAL HEAD.

A particular description of the machinery and apparatus proper to be employed in connexion with inclined planes, including stationary machinery, of all descriptions.

Queries.

1st. Drawing and description of a stationary engine and its various appendages?

2d. Whether *high* or *low* pressure engines are preferable? and the reasons of such preference?

3d. The dimensions, capacities &c. of an engine and its various parts, that has operated successfully, upon an inclined plane of given inclination and extent?

4th. Examples of the performance of such an engine?

5th. Drawing and description of the most approved horse gin, employed as a substitute for a stationary engine together with examples of its performance?

6th. Drawing and description of a stationary brake of the most approved construction?

7th. The manner of constructing and adjusting drums? their dimensions and the materials of which they should be formed?

8th. The greatest distances to which inclined planes may be extended to advantage?

9th. Whether ropes or chains are preferable as a means of traction upon inclined planes? and the reasons of such preference?

10th. Their respective sizes, or the weight of a given length of each? and the mode of attaching them to their drums, and to the carriages? their durability respectively?

11th. Endless chains or ropes? any objections to their employment upon inclined planes?

12th. The dimensions, mode of constructing, and adjusting rope or chain rollers?

13th. The resistance attendant upon the *motive* apparatus of inclined planes?

14th. Wells, reservoirs, aquaducts, pumps, &c. stationed upon the road, whether for the supply of water for locomotive or stationary engines?

15th. Drawings and description of the machinery for self acting planes? their application and utility upon Rail-ways for a reciprocal trade, &c. &c.?

IX. GENERAL HEAD.

The structure of scales for weighing carriages, &c. and of cranes for the transposition of burdens &c., as also, the construction and arrangement of warehouses, connected with docks and Rail-roads, to be carefully considered, and the most approved structures of this character to be specified.

Queries.

1st. Drawing and description of the most approved scales for weighing carriages, loaded or unloaded? also a description of the weights employed for that purpose?

2d. The best and most convenient mode of connecting them with the Rail-ways, warehouses, &c.?

3d. Drawings and descriptions of the most approved and useful cranes, for the elevation and transposition of heavy weights? also of portable or moveable cranes? their cost, &c.?

4th. Drawings illustrative of the plan, elevation and arrangements of the most convenient warehouses? their adjustments, in order to subserve the double purpose of trade by land and by water?

5th. Turning and draw platforms? and their connexion with docks, depots, warehouses, &c.?

6th. Plans and descriptions of branch and temporary or moveable Rail-ways? and their connexion as above?

7th. Plot exhibiting the most convenient arrangement for a depot? the disposition of Rail-tracks, railed platforms, &c. in connexion with it? the disposition of scales, cranes, warehouses, &c. in connexion with it?

8th. Plot of a carriage park? arrangement of sheds for storeing carriages, of stables for horses? of store houses for harness, &c.?

X. GENERAL HEAD.

The arrangement and construction of Work shops for the manufacture of Rail-road carriages, and other machinery applicable to Rail-roads, together with the process of smelting, rolling, and preparing wrought iron rails, &c. for Rail-roads.

Queries.

1st. General plans and elevations of the most convenient work shop, for the construction of carriages, and other Rail-road machinery? the disposition of the apparatus, employed in the manufacture of such machinery?

2d. Any peculiarities in the form, size and construction of tools, employed in the manufacture of Rail-road machinery?

3d. Drawings and descriptions of the most approved lathes for turning, boreing, &c? also of any peculiarities in the tools applicable in such operations?

4th. Ground plan, elevation, &c. of smelting furnaces, and the buildings connected with them?

5th. Ground plan, elevation, &c. of forges? the buildings connected with them? also the disposition of the machinery employed in them?

6th. The dimensions form and construction of rollers for making bar iron of various sizes? round iron? sheet iron? wrought iron rails, &c.?

7th. The most economical mode of smelting iron ore? The comparative expense of smelting with coke and charcoal, all things considered?

8th. The most economical process for preparing *blooms*, suitable for the construction of rails for the Baltimore and Ohio Rail-road?

9th. The most economical process for moulding or *drawing* them into rails of the description just alluded to?

10th. The manner of perforating the rails, and preparing their extremities, whether by scarfs or by tongue and slit? and the machinery best suited to these purposes?

11th. The most economical method of preparing iron for the construction of axles? for the construction of chains and chain-gearing? also for the construction of the different parts of a locomotive engine? and for those of a stationary engine?

12th. The best mode of preparing castings for branch rails, turns-out, &c.? for friction rollers, rope rollers, drum gudgeons, &c. &c.? and for the different parts of locomotive and stationary engines, and Rail-road carriages, in the construction of which cast iron may be used? together with drawings illustrative of these several parts and appendages?

13th. The consistency or mixture of the different qualities of cast iron applicable to these several purposes?

14th. The best method of *case hardening* cast iron? and of case hardening wrought iron, and the parts to which these processes should be applied? the appropriate descriptions and temper of steel in its different applications?

XI. GENERAL HEAD.

Defects and imperfections observable in the construction of Rail-roads, and in the application of the machinery employed upon them.

Queries.

1st. Any derangements in the bed of a Rail-road? its embankments, side walls, culverts, bridges, tunnels, &c. &c.? and the occasions of them?

2d. Any defects discoverable in the management of the machinery, the conducting of workmen, labourers, &c. and the means of obviating them?

3d. Errors committed in the location and construction of Rail-roads, the inconveniences resulting from them, and the occasions of them?

4th. Various accidents that may have occurred upon Rail-roads, and the precautions necessary to prevent their recurrence?

5th. Any injudicious application of motive power? and the mode of remedying it?

6th. In general any want of economy in the construction and disposition of the various parts of a Rail-road and its appendages, and the causes to which it is attributable?

7th. Examples of Rail-roads that have failed in the accomplishment of the purposes for which they were intended? and the reasons of such failure? &c. &c. &c.

In conclusion it may be observed, that most of the intelligence here called for may be procured from books and pamphlets devoted to the interesting subject of Railways, and may be brought either in a printed form, or in manuscript extracts.

Additional queries of equal interest, which have not occurred, and have consequently been omitted in this hasty compilation, will no doubt be suggested in the progress of the investigations contemplated to be made, and will have an equal claim upon the attention of the gentlemen composing the mission.

The foregoing instructions were then enclosed and forwarded to the President of the Rail-road Company, with the following communication.

Office of Board of Engineers,
Baltimore, Oct. 24th, 1828.

Sir—In compliance with your request, and with the requisition of the Board of Directors, as signified to this Board by yourself, a series of instructions and inquiries exhibiting a variety of objects that claim the attention of the gentlemen commissioned on a voyage to England, for the purpose of obtaining the most useful practical information on the subject of Rail-roads, and for other purposes, have been hastily compiled, and are herewith submitted for the approval of the Directors.

In behalf of the Board of Engineers,
I have the honour to be, Sir,
Your most ob't serv't,
Signed, S. H. LONG, *Pres't.*

P. E. Thomas, Esq. *Pres't B. & O. R. R. Comp.*

C. 1. (See Nar. p. 82.)

Sir—Upon mature deliberation it is deemed advisable, that the route for the Rail-road along the valley of Potomac, at the Point of Rocks, be kept at such level, not exceeding 30 nor less than 24 feet, above low water mark, as will occasion the least expense of grading. Also, that another route be surveyed as for a definitive location, commencing at the lower Point of Rocks, and rising by the most easy grade from the level assumed as above by the most favourable valley route leading to and across the lowest summit situated between the waters of Tuscarora creek and the run entering the Potomac, about one mile below the Point of Rocks. Care will be taken to effect, as nearly as practicable, an equable ascent on the route last intimated.

You are permitted to reconsider the elevation of the summit level between the Monocacy and the Point of Rocks, and elevate or depress it as the nature of the case may require.

In all your surveys for location, you will cause estimates of cuttings and fillings to be made (the estimate to be made for the greater amount only,) in all situations where the entire surface of the road-bed is to be formed either by cutting or filling. It is expected that the estimates as well as the drawings will be made *pari passu* with the surveys.

Signed, S. H. LONG, Bt. Lt. Col.

Lt. Walter Gwynn.
October 23d, 1828.

D. 1. (See Nar. p. 82--110--130--150, &c.)

Col. Long also submitted the form of a monthly estimate, which was adopted, and is as follows, viz:

MONTHLY ESTIMATE OF FUNDS,

Required on account of CONSTRUCTION *for the Balt. and Ohio R. R. by* *Superintendent for the month of* 182

No. of Division	On what sections	Nature of the service	Names of the Contractors.	Force employed Men	Force employed Horses	Paid for preceding month		Required for current month	
No.	Numbers			No.	No.	Dolls	Cts	Dolls	Cts
			Aggregates						
			For services of Assistants						
			Subsistence of horses for Assistants at $ per month						
			Contingencies for the current month						
			Amounting to						
			Amount of Estimate for the month of last						
			Balance due to						
			Amount required for the month of 182					$	

Names of Assistants	Capacity	Pay per month Dol	Pay per month Cts	Remarks on the Progress of Construction

Superintendent.

October 28th, 1828. Signed Duplicates.

E. 1. (See Nar. p. 84.)

The subject of constructing transverse road drains and protecting the surface of the road-bed, by a pavement of broken stone, and of paving side and berme drains, being under consideration, it was

Resolved, that in all situations where the road is conducted on sloping ground, or in side cutting, for a distance greater than 150 yards, a transverse road-drain, at least 18 inches square, leading across the road, will be required, in order that the water falling upon the sloping ground above the road, into the upper side drains, may be conveyed across the road.

Resolved, that broken stone of a suitable quality, and in fragments weighing no more than four ounces each, be prepared and kept in readiness, to spread on the road in a manner to form a consolidated covering 3 inches thick and 20 feet wide, on such parts of the road as may hereafter be designated by this Board; it being the intention of the Board to have all embankments of a height exceeding 2 feet, supplied with a covering of this description; and that the superintendent be charged with the management of this part of the work, and instructed to make arrangements for its accomplishment as soon as practicable.

Resolved, that the side and berme drains, to be constructed in the *deep cut*, on the 4th and 5th sections of the first division, be secured from the abrasion of water currents, by a pavement of such construction as the superintendent may deem appropriate, and that the descent along the drains first mentioned be at least one foot in 100 yards. Also, that the drains last mentioned be turned outward from the road, at their extremities, and lead into appropriate drains in rear of the spoil banks on either side of the cut.

Resolved also as the sense of this Board, that in reference to the berme drains, arrangements ought to be made without delay for their adjustment, inasmuch as their foundation ought to be undisturbed earth retaining its natural solidity.

Resolved, that a copy of the foregoing resolutions be furnished to the superintendent for his guidance in executing the work therein contemplated.

October 29th, 1828.

F. 1. (See Nar. p. 84--88--&c.)

October 31st, 1828.

Sir—I have the honour herewith to enclose an extract from the proceedings of the Board of Engineers, having reference to

the work entrusted to your superintendence, by this Board. (See preceding Document.)

It is not expected that the cross drains mentioned in the resolutions will be completed, till the grading of the road shall have been so far advanced, that stone for their construction can be transported on the line of the road.

It is believed that immediate measures ought to be taken for the adjustment of the berme drains in the "Deep Cut"—otherwise their outlets may be so obstructed by the spoil banks now forming, as to render their adjustment in this respect too expensive, while at the same time bermes may not be left by the workmen, in a manner sufficiently substantial to support the drains.

The width of the cutting on the easterly or valley part of Section No. 4, has been so increased as to permit the centre line of the road to be one foot further south than was contemplated in the original location. This deviation may be increased to any extent you may deem advisable, without materially deranging the work already done at that place.

The execution of the work contemplated by the resolutions, and the manner of accomplishing it, whether by means of proposals, or private arrangement with contractors, is confided to your discretion.

Signed, S. H. LONG, Pres't Board Engrs.

CASPAR W. WEVER, Esq. Superintendent.

A verbal communication was made by the President of the Rail-road Company to the Board of Engineers, on the subject of viaducts across Gwynn's falls and the Patapsco, signifying that the Board of Directors were not disposed to authorize any departure from the plan of construction previously recommended by the Board of Engineers.

This intimation of their opinion was given in reply to a communication from the President of the Board of Engineers, made in conformity to a suggestion of P. E. Thomas, that the Board of Directors might have an opportunity of signifying their preference for stone or wooden structures at the places above mentioned.

The President of the Rail-road Company also stated, in reference to the resolution of the 3d instant, a copy of which has been laid before the Board of Directors, that the Board of Engineers were authorized to take any steps they might deem proper for the commencement and prosecution of the work of construction at the lower Point of Rocks.

November 4, 1828.

G. 1. (See Nar. p. 86.)

November 5th, 1828.

Sir—Your communications on the subject of furnishing Magothy Pine for the construction of a part of the Baltimore and Ohio Rail-road, have been referred to this Board, and I have been instructed to inform you that any quantity not exceeding 200,000 feet, board measure, will be received of you within six months from the first of December, 1828, at the rate you propose, viz. $2 per 100 feet; to be delivered at the option of this Board, either at Baltimore, or at such other point or points on the Patapsco below the head of boat navigation as the Board may designate. The timber must be best heart-pine, sound, free from shakes or splits, from knots more than one inch diameter—from sap and feather edge—straight, and free from windings, of quartered timber—six inches square, and in lengths varying by five feet, from 15 to 50 feet; the longer the piece, the better will it be adapted to the purpose of construction, provided it answers the description above given.

The timber above mentioned is required for rails, and must be of the most durable kind.

Timber of various other dimensions will be wanted for other purposes, but cannot as yet be designated.

Please do me the favour to acknowledge the receipt of this letter, and inform me as to the quantity you may be disposed to furnish, and the time when it may be in readiness for delivery.

Signed, S. H. LONG.

H. 1. (See Nar. p. 86, 98.)

Sir—Having completed the work assigned you, in reference to a definitive location of the Rail-road between Chapel ridge and the "Point of Rocks," and thence upwards to Hook's bottom, the officers and party acting under your superintendence, will proceed to Parr's spring ridge, and effect an approximate location at the several summits at that place, connecting your former surveys in the valleys of Bush and Linganore creeks and their tributaries, with those now in progress in the valley of the Patapsco, near the confluence of Parr's and Gillis' falls.

In the performance of this service, the surveys should be preceded by a careful reconnoissance. Delineations illustrative of your surveys will be required as heretofore.

You will apprise this Board by letter, of the progress and probable period of completion of the work in which you are now engaged, and of any questions in regard to which you may require additional information.

Signed, S. H. LONG, Pres't Board Engrs.

Lt. WALTER GWYNN.

November 11*th*, 1828.

I. 1. (See Nar. p. 88.)

SIR—Your letter of the 10th instant has been received. In reply, I am directed by the Board to signify their approbation of your intention in reference to changing the location on the 19th section—and to issue the following instructions for your guidance in your farther operations. Drawings in plan and profile, illustrative of the surveys made by Capt. McNeill's Brigade, with reference to the definitive location of the Rail-road, between the "Corner Stone" and the forks of the Patapsco, will be prepared and furnished to this Board with all possible despatch.

In the mean time, having completed the location as above to the forks of the Patapsco, surveys for an approximate or experimental location, between the point just mentioned and the confluence of Parr's and Gillis' falls, will be prosecuted with all practicable diligence. In regard to this part of the service, it is also deemed indispensable that duplicates of the field notes be made daily—one of which is intended for the archives of this office, and the other for the use of the superintendent. One of the duplicates, at least, must be made in ink.

Mr. C. R. Barney has been detailed to aid you in the services now before you, and will be able to assist either yourself or Mr. Hazzard in the prosecution of the surveys—it being indispensable that one of you superintend the drawings, while the other is occupied in the further prosecution of the surveys.

A box, furnished with a drawing-board, and a lid that may also be applied for that purpose, and containing the requisite stationary, &c., is transmitted for the use of your party.

Agreeably to the verbal arrangement heretofore made, you are authorized to hire a room in the vicinity of your camp, whither the officers and assistants of your party may repair after having completed their daily duties in the field, and execute the drawings and transcripts of field notes, at times when the field operations are unavoidably suspended.

Signed, S. H. LONG, Pres't Board Eng'rs.

Lieut. WM. COOK.

November 11*th*, 1828.

K. 1. (See Nar. pp. 92, 178, 180.)

Sir,—Pursuant to a resolution of the Board of Directors of the Baltimore and Ohio Rail-road Company, a stone viaduct will be constructed across the Patapsco at Pierpont's Rock.—The water-way under the viaduct will be provided for by means of two arches of 55 feet span each—springing from their abutments and pier at an elevation of from 10 to 15 feet above extreme low-water of that stream. The width of road-way will be 24 feet between the parapet walls. The form and structure of the viaduct will be such as to render it plain and substantial, in the highest degree, *and will be such as this Board may approve.* The direction of the viaduct will be such that a line passing longitudinally along the centre of the road-way, may commence at station 496 in section No. 21 of the 1st division of the Rail-road, and run in conformity to the following courses and distances, viz: Commencing at station, or stake marked 496 and running N. 7° 30′ W. 132 feet; thence N. 14° 15′ W. 130 feet, being the centre line of the road-way of the viaduct; thence N. 7° 15′ W. 100 feet; thence N. 6° 45′ E. 100 feet; thence N. 13° 45′ E. 100 feet, and thence by the location as heretofore made.

One of the assistant engineers in the service of the Rail-road company will be directed to designate the route contemplated in the foregoing specification. The position of the viaduct may be altered in such a manner as to effect a transfer northwardly and longitudinally of the viaduct, not exceeding 10 feet, as the nature of the locality may seem to require.

A change in the location on the 10th section of the same division is also required by the same authority. The change alluded to is such, as to effect a prolongation of the right line pursued by the road in passing from the 9th to the 10th section, till it meets the line of the road as now located and graded on the 11th section. The object of this change is to obviate the necessity of a wooden viaduct as heretofore contemplated by this Board, and to provide the means of substituting therefor an embankment leading across the valley of Davis's or Gadsby's run. The new location, as above contemplated, will be traced on the ground and designated by one of the assistant engineers as soon as practicable.

Signed, S. H. LONG, Pres't Bd. of Engrs.
Caspar W. Wever, *Superintendent.*
November 17, 1828.

L. 1. (See Nar. pp. 92, 178, 180.)

Sir,—A stone viaduct leading across the Patapsco at Pierpont's Rock having been authorized by the Directors of the Baltimore and Ohio Rail-road Company, a corresponding change in the location at that place becomes requisite. The change will be such as to correspond to the following courses, viz: commencing at station or stake marked No. 496 and running N. 7° 30′ W. 132 feet; thence N. 14° 15′ W. 130 feet, being the centre line of the road-way of the viaduct; thence N. 7° 15′ W. 100 feet; thence N. 6° 45′ E. 100 feet; thence N. 13° 45′ E. 100 feet, and thence by the location heretofore made.

You are accordingly directed to retrace the line, and to effect a location in conformity to the foregoing data.

Having completed this service, you will effect another change in the location near the 6th mile stone on the Washington road. The change at this place will be such that the line of the road may be coincident with a continuous right line passing from the 9th section and meeting the line of the road as now graded on the 11th section, in the field of D. A. Smith, Esq., or that the line of the road may be coincident with that first traced by Capt. McNeill's brigade for that purpose.

The field notes taken on this occasion, which are in the possession of Lieut. Cook, will be your guide in re-establishing the location.

Signed S. H. LONG, Prest. Bd. Engrs.
Lt. J. Barney. Bt. Lt. Col.
November 17th, 1828.

M. 1. (See Nar. p. 95.)

Office of the Board of Engineers,
Baltimore, Nov. 17th, 1828.

Sir—In conformity to a resolution of the Board of Engineers, I have the honour to communicate the following instructions for your guidance in the execution of the work confided to your superintendence by this Board.

The work alluded to is intended to embrace the entire formation of the road-bed, on that portion of the route situated at and near the Lower Point of Rocks, and extending through such distance that the materials necessarily excavated may be converted into walls, bridges or culverts, and thus afford a continuous road-bed.

One of the Engineers recently employed in the location of that part of the road, will be instructed to furnish you with explana-

tions in regard to the direction, position, demarcations, &c. of the road, and the superintendent of construction, Caspar W. Wever, Esq. will be requested to visit and inspect your operations from time to time, and give the necessary instructions relative to the manner of construction.

It is expected that you will exhibit a full statement of all expenditures, supported by vouchers in conformity to the 7th article of the Regulations for the Engineer Department, a copy of which is herewith transmitted for your information and guidance.

Blank forms for pay rolls and accounts, are herewith transmitted, together with a form for a monthly estimate, which will be required on or about the first of each month; and a form for your account for personal services while in the employ of the Rail-road Company.

A brief report of your operations will also be required in company with your monthly estimate, which may be included in the remarks subjoined to the estimate.

It is to be expressly understood that the Board reserve to themselves the privilege of suspending the operations contemplated in the foregoing instructions, whenever they may deem proper, and that the Rail-road Company will be held responsible for the expenditures incurred, only to the date of such suspension, a reasonable time being allowed to yourself for the adjustment of your accounts.

You are requested to apprise this Board of the receipt of these instructions, and to furnish an estimate for the residue of the current month, to be included in the monthly estimate for December next, in order that funds may be placed to your credit in due form.

Should you desire more particular information as to the objects of your employment, you are respectfully invited to a personal interview with the Board of Engineers, at their office in Baltimore, whenever it may suit your convenience.

Signed, S. H. LONG, Pres't Board Engrs.

THOMAS SHRIVER, Esq.

November 17th, 1828.

SIR—In conformity to a resolution of the Board of Engineers, Thomas Shriver, Esq. of Fredericktown, has been appointed as agent for this Board in preparing the bed of the Rail-road on a portion of the 6th division, commencing at the Lower Point of Rocks, and extending about one-third of a mile along the valley of the Potomac, as designated by Lt. Gwynn, under whose direction the location has been made at that place. You are accordingly requested to explain to Mr. Shriver the manner in

which the road is to be constructed—which may be done at your option, either by personal interview or by letter.

Lieut. Gwynn will be directed to furnish a copy of the field notes taken in reference to the location, as soon as the duties in which he is engaged will permit.

Signed, S. H. LONG, Pres't Board Engrs.

CASPAR W. WEVER, Esq.

November 17th, 1828.

SIR—Thomas Shriver, Esq. of Fredericktown, has been appointed as agent for the Board of Engineers for carrying on the work of grading for the Rail-road at the Lower Point of Rocks. You are accordingly to give him any information with respect to the location on that part of the route, which may be requisite to a full comprehension of the dimensions of the road. You will designate the stakes at which it may be proper to commence and terminate this part of the work: beginning probably at station No. 1, and ending at such station that the whole amount of excavation in rock, together with the extent of road that may be formed of the excavated materials, may be included between them. It is not intended, however, that the section on which Mr. Shriver is to operate, shall embrace more than 25 stations; in this respect, however, you will be governed by the nature of the ground, and the considerations above suggested.

You are also requested to report upon the extent of the section, and any other particulars in relation to it, as soon as you may have decided thereon. In case this duty should be likely to interfere with other duties requiring your personal attention, it may be assigned to Lieut. Trimble or Thompson, as may best subserve the interests of the service in which you are engaged.

Signed, S. H. LONG, Pres't Board Engrs.

Lt. W. GWYNN.

The foregoing instructions were ratified by the Board of Engineers, and ordered to be forwarded on the 25th Nov. 1828.

N. 1. (See Nar. p. 98, 99, 126.)

4th December, 1828.

The foregoing resolutions being under consideration, it was Resolved, that the line from the First Stone to the valley of Jones' Falls, as designated in the report dated June 23d, 1828, be retraced, and that the necessary additional surveys be made for the purpose of ascertaining the best and most feasible routes for connecting the said line with such point as may he required

at the margin of tide water within the city of Baltimore, in conformity to the restrictions prescribed in the resolution of the Board of Directors, passed the 28th of May, 1828; and that this duty be performed as soon as the necessary assistant engineers, now engaged on other duties, can be assigned thereto, without detriment to other parts of the service.

Resolved, that the resolution of this Board, dated October 20th, so far as relates to the construction of a wooden viaduct across Gwynn's falls, be rescinded; that full restitution be made for the work that may have been done in conformity to the resolution just mentioned; and that measures be taken for the construction of a stone viaduct, in conformity to the second resolution as above recorded.

Resolved, that instructions be issued to Caspar W. Wever, Superintendent, in reference to the construction of the stone viaduct, authorized by the preceding resolution; as also to the adjustment of any claims for work that may have been performed in furtherance of the construction of a wooden viaduct.

O. 1. (See Nar. p. 100.)

Baltimore, Dec. 4th, 1828.

Sir—In conformity to a resolution of the Board of Directors, passed on the 1st instant, the Board of Engineers have been required to cause a stone bridge, leading across Gwynn's falls, on the 1st section of the Rail-road, to be constructed instead of a wooden viaduct, as previously authorized by this Board. You are accordingly requested to allow the contractors, who have been employed on this work, a reasonable compensation for the labour actually performed in furtherance of the construction of the wooden viaduct, and to make the necessary arrangements for the construction of the stone bridge to be substituted therefor. The dimensions, form, and mode of construction, will be such as to ensure freedom of passage for the water of the stream, together with simplicity, neatness and permanency of structure, and will be such as this Board may approve.

You are requested to report to this Board your views in reference to the particulars above mentioned, and to submit for their inspection and approbation any measures or plans you may think proper to adopt for the accomplishment, not only of the work under consideration, but of any others of a similar character connected with the Rail-road, which you may now have in process under your superintendence.

Signed, S. H. LONG, Pres't Board Engrs.

SPAR W. WEVER, Superintendent.

P. 1. (See Nar. p. 101.)

Baltimore, Nov. 29th, 1828.

SIR—The decision as to the sum that may be paid, in addition to those already paid, on account of work done on the 4th and 5th sections of the Rail-road, is requested of the Superintendent, with this restriction on the part of the Board of Engineers, viz. that no payment be made that shall exceed the amount due on those sections for work actually done, estimating the same at the contract price, viz. 18 cents per cubic yard. Any payment you may think proper to make, short of the amount just alluded to, will receive the sanction of this Board.

Signed, S. H. LONG, Pres't Board Engrs.

CASPAR W. WEVER, Esq. Superintendent.

The following statements were appended to the foregoing letter:

Amounts actually paid for excavation of sections 4 and 5, up to Saturday the 22d—

Stocksdale & Co. - - -	$4461 00	
Bennet, - - - - - -	3128 80	
Wood, - - - - -	2450 25	
		$10,040 05

Actual expenses said to have been incurred to the same date—

Stocksdale & Co. - - -	$5382 70	
Bennet, - - - - -	5399 50	
Wood, - - - - - -	2808 45	
		13,590 65
Actual amount paid contractor by Rail-road Com.		10,900 00
Balance due for expenses said to be actually incurred prior to November 22d, - - -		2,690 65
Actual amount of excavation prior to the above date, 62,000 yards, at 18 cents, - - - -		11,160 00

Q. 1. (See Nar. p. p. 102--103, 132.)

December 6th, 1828.

It appearing by a representation from the contractor upon the 4th and 5th sections, that the texture of earth upon these sections, to a great extent, rendered it more expensive and difficult to be removed than had been expected, and the superintendent being of opinion that the contractor on those sections is entitled to further allowance, according to the article contained in his

proposals in which a stipulation is provided for such allowance, at the discretion of the Board of Engineers and Superintendent, in case the earth to be removed should be more difficult and expensive to excavate than was expected. It was therefore, upon motion of P. E. Thomas, Resolved, that the instructions given by this Board on the 29th ult. and adopted on the 4th instant, in reference to this subject, be cancelled, and that the case be referred to the Superintendent of construction, and a committee from this Board, who are requested to make a careful inspection of the premises, and authorized *to estimate* such additional compensation for the work already done, or which may hereafter be done, upon those sections, as in their judgment shall be deemed equitable and just, in conformity to the provisions stated in the proposals above mentioned; also, *that they report thereon at an early date.*

Whereupon was appointed P. E. Thomas, a committee to carry into effect, in conjunction with the Superintendent, the foregoing.

R. 1. (See Nar. pp. 105 to 109.)

My dear Friend,—A difference of opinion having arisen between the President of the Board of Engineers and the Superintendent of Construction as regards the respective duties of the Board of Engineers and of that officer, in relation to the preparation of the road; after mature consideration, under feelings of the most anxious solicitude that all collisions might be avoided which would in any degree impair the great interests of the work, or retard its execution, I respectfully suggest, that as a provisional arrangement, to take effect until the return of those members of the Board now absent abroad, (when a definitive and satisfactory adjustment of this subject can be agreed upon,) the Superintendent be furnished with the necessary instructions, as to the location of the road, its course, width, grade, structure, and all other information he may desire, so as to enable him clearly to understand the views and conclusions of the Board in relation thereto—that it then be considered his duty to take exclusive charge of the subject, with full liberty to call to his aid such assistants as he may deem necessary, which assistants, and all contractors and subordinates employed under them, being directly responsible to the Superintendent, he of course will be responsible for the faithful and correct discharge of their several and respective duties and obligations.

I flatter myself that this proposal will be satisfactory until the return of our colleagues from abroad, or until some positive inconvenience or injury to the service, shall have been ascertained to arise from its adoption.

Very sincerely, &c. &c.

Signed, P. E. THOMAS.

Col. S. H. Long, *Prest. Bd. of Eng'rs.*
Baltimore, December 9, 1828.

S. 1. (See Nar. pp. 105 to 109.)

Baltimore, Dec. 10th, 1828.

Dear Sir,—Your letter of yesterday on the subject of a compromise between Mr. Wever, superintendent in the employ of the Board of Engineers of the Rail-road Company, and myself, is now before me. The terms of compromise you therein propose, I cannot regard as correct or equitable, either in principle or practice,—inasmuch as they are directly at variance with the regulations prescribed by the Board of Directors for the government of the Engineer Department in the Rail-road service:—and inasmuch as they do not accord with the best experience and usages in relation to Engineers and their Superintendents, in any other similar service. I accordingly feel it a paramount duty, to protest against any arrangement predicated on the terms alluded to, or any other arrangement that is not compatible with the Resolution of the Board of Directors authorizing the appointment of a Superintendent, and with the Regulations for the Engineer Department established by that Board.

Nevertheless, regarding the present posture of the affairs of the Rail-road Company with respect to the application for relief about to be made to the General Government, with respect to the settlement of the question of right of way now pending between the Rail-road Company and the Chesapeake and Ohio Canal Company, with respect to the decision upon the manner of connecting the main line of the Rail-road with the city of Baltimore now demanding the attention of the Rail-road Company and the city Corporation;—with respect to the expense and trouble attendant upon the construction of the 1st and 2d Divisions of the Rail-road—and to the difficulties that might ensue from any change in the functionaries now acting in the service of the Company;—I do consent, that the Superintendent be subject to your immediate direction and control while employed in the performance of the duties already assigned him, by the

Board of Engineers, in relation to those divisions—and that he be at liberty, with your consent and approbation, as a member of the Board "to call to his aid such assistants as he may deem necessary to the performance of his duties as Superintendent, which assistants and all contractors and subordinates employed under them shall be directly responsible to the Superintendent," Provided that nothing herein stated shall be construed as having a tendency to restrict the Board of Engineers from a full exercise of the functions vested in them by the Regulations of the Engineer Department heretofore referred to, and provided that *you hold yourself responsible as a member of the Board, for a faithful and skilful performance on the part of the Superintendent.*

I further beg leave to state, that I do not question the ability of Mr. Wever to discharge the appropriate duties of a Superintendent, but that I do not believe him qualified to perform the duties of an Engineer.

In allusion to this subject I feel it incumbent on me further to state, that the responsibility herein adverted to, and which you seem disposed to assume, is a very high one,—such as I should feel exceedingly repugnant to subject myself to, being persuaded that the duties under consideration, call for a developement of extraordinary skill in engineering, of which I am confident the Superintendent is not possessed.

I beg you to be assured that I know of no offence that I have committed against Mr. Wever, except that I cannot admit that he is possessed of the skill just mentioned, or consent to his being invested with the power and privileges he claims, nor that he is competent to discharge the duties of an Engineer, and, that I am not willing, in any shape, to be answerable for the mistakes he is liable to commit, while acting in that capacity.

I shall always be happy to concur with you in any measures based upon the rules that ought to govern us,—entitled to the sanction of a professional Engineer,—and calculated to promote the interests of the Company in whose services we are engaged.

I am, sir,
With sincere respect,
Your friend and serv't,
(Signed) S. H. LONG.

P. E. Thomas, Esq.
Member of the Bd. of Engrs.

T. 1. (See Nar. p. 112.)

Whereas, Caspar W. Wever, duly employed by the Board of Engineers to officiate in the capacity of Superintendent of construction, in the service of the Rail-road Company, has repeatedly absented himself from the performance of his duties, without the consent or approbation of this Board, and whereas it appears that the said Caspar W. Wever has signified his intention again to absent himself for at least two weeks, and whereas the personal attendance and unremitted attention to the duties of the Superintendent, have hitherto required and do still require the presence of the said Caspar W. Wever, and an uninterrupted exercise of his exertions in fulfilment of the duties of his appointment:

Therefore, as in duty bound, I do hereby protest against the allowance of any such indulgence to the said Casper W. Wever, and that he be required to remain in the discharge of his appropriate duties as Superintendent, till such time as in the opinion of this Board, his services may temporarily be dispensed with.

Respectfully submitted,

Signed, S. H. LONG, *member of the Board.*

To the Board of Engineers of the Baltimore and Ohio Rail-road Company.

Dec. 19th, 1828.

U. 1. (See Nar. p. 113.)

Baltimore, Dec. 24, 1828.

The Board taking into consideration that the examinations made in 1827, on behalf of the Rail-road Company, were at that time restricted to the district south of the Pennsylvania line, on account of the legislature of that state having until after that period refused its assent to the passage of the road within its limits, and that the restrictions alluded to are now removed, it was on motion

Resolved, That an examination be made during the current winter, for the purpose of ascertaining the features of the country situated between the Potomac river at Cumberland, and the Yaughagany river, and for the purpose of ascertaining as nearly as practicable without actual surveys, the most favourable route for a Rail-road between these two rivers, leading in a direction for Pittsburgh, together with the circumstances upon which the preference of any route over others that may have a claim to consideration, is founded.

Resolved, That Lt. Trimble, whose services in other branches of the Rail-road service may for a time be dispensed with, be

detailed for this service, and that the following instruction prepared and submitted by the President, be furnished him for his guidance in its performance.

Office of the Board of Engineers,
Baltimore Dec. 24th, 1828.

Sir.—It has been determined by the Board of Engineers, that the country situated between the Potomac at Cumberland and the Yaughagany river, comprising the main ridge or back bone mountain, of the Alleghany range be examined during the current winter, with the view of ascertaining its geographical features and the facilities it may afford, for the passage of the Baltimore and Ohio Rail-road, in a direction from Cumberland to Pittsburg; as also the most favourable route leading in that direction, together with the circumstances attending the various routes that may have a claim to an examination. The Board having selected you for the performance of this service, you are accordingly requested to enter upon the duties connected therewith as soon as practicable. You will please furnish to this Board without delay, an estimate of funds required for the execution of this service, and make the necessary arrangements for the accomplishment of the objects prescribed in these instructions. It is expected that you will report from time to time, your progress in the duties assigned you, and the probable period of their completion. Signed,

S. H LONG,
President of the Board of Engineers.

Lt. J. Trimble, *Baltimore.*

W. 1. (See Nar. p. 117.)

Sir—In conformity to a resolution of the Board of Directors of the Rail-road Company, providing for the construction of Stone Viaducts across Warfield's lane and Mill race, and also across Gadsby's and Still-House runs on the 9th, 10th, and 12th Sections of the 1st Division of the Rail-road, you are requested to take the requisite measures for the accomplishment of this service.

You are also requested to communicate to this Board for their inspection and approbation, a plan and description of each structure above alluded to, setting forth the dimensions, form, and manner of construction you may deem most appropriate for the

respective works under consideration, together with an estimate of their probable cost.

Signed, S. H. LONG,
President to Board of Engineers.

CASPAR W. WEVER, Esq.
Superintendent.
Baltimore, January 17th, 1829.

X. 1. (See Nar. pp. 121 to 123, 130 to 141, 152.)

Office of the Board of Engineers,
Baltimore, Jan. 20, 1829.

Original Reading.

Your accounts for the last Quarter of the year 1828 have been submitted to the Board for their inspection and approval, in conformity to the Regulations of the Engineer Department of the Baltimore and Ohio Rail-road Company. On examination, they have, with a single exception, been found informal, and in many respects defective, and are accordingly retained in this office, in order to afford you the opportunity of making the necessary explanations and corrections preparatory to their being finally acted upon by the functionaries of the Rail-road Company constituted for that purpose.

The steps proper to be taken with a view to their adjustment and the facts proper to be known in order to establish the authenticity and validity of your accounts, are as follows, viz.

Reading, as amended by Mr. Thomas.

Your accounts for the last quarter of the year 1828 have been submitted for the inspection and approval of this Board, in conformity to the Regulations of the Engineer Department of the Baltimore and Ohio Rail-road Company. On examination they have been found informal and not in accordance with the regulations adopted for the government of the Engineer Department; they are accordingly retained in this office, in order to afford you the opportunity of making the necessary corrections preparatory to their being finally acted upon by the functionaries of the Rail-road Company constituted for that purpose.

The steps proper to be taken with a view to their adjustment, are as follows, viz.

1st. The amount of work done, on each contract, whether for grading, masonry, or the delivery of stone, to be determined by actual measurement, which may be made by competent assistants now attached to your department of the Rail-road service.

The assistants should be required to make to yourself certified returns of the amounts thus determined, setting forth the section and division of the Rail-road on which the measurements may have been made.

2d. "A statement of the contracts entered into," setting forth the names of the contractors,—the localities contemplated by the contracts,—the nature of and stipulations embraced by the contracts, and the amounts actually paid on each contract.

3d. A statement of any extra allowances that may have been made to any contractor or other persons acting under your superintendence, in the Rail-road service, together with the reasons and nature of such allowances.

4th. A statement of the names, capacity, and term of service of the several assistants in your employ, and the rates at which they serve, together with the amounts paid them for their services.

Forms of Returns for the amounts of work done, whether of grading, masonry, delivery of stone, or other work, will be furnished you, for the use of your assistants,—and forms of Returns embracing the objects for which your certificate is wanted,—are herewith furnished.

Upon the accordance of these Returns with the accounts already submitted, the authenticity and validity of the latter may be established.

The forms for Returns above alluded to are as follows, viz:

Form 1st.	Return of Grading,	by Asst. Supt. of Const.
Do. 2d	Return for do. run'g measure	by do. do. do.
Do. 3d	Return for Masonry	by Asst. Supt. Masonry
Do. 4th	Return of Payments for Cons.	by Superintendent
Do. 5th	Return for Conting. and Extra allown's for Con.	by do.

The accounts of your assistants should be rendered agreeably to the customary Forms adopted by this Board.

I have the honor to be,
Respectfully,
Your obed't serv't,

CASPAR W. WEVER, Esq., *Superintendent.*

The following are examples of the Forms alluded to in the foregoing Instructions:

FORMS REFERRED TO IN THE FOREGOING INSTRUCTIONS.

Form I.

Return of Grading, or of Excavations and Embankments executed in behalf of the Construction of the Baltimore and Ohio Rail-road, it being understood that whenever the excavation exceeds the embankment, or the embankment exceeds the excavation, the greater only is estimated.

Division No.	Section No.	Amount of Excavation	Amount of Embankment	Remarks
		cub. yds.	cub. yds.	

I certify that I have measured and estimated the excavation and embankment made on the several sections specified in the above return, and that the several amounts as exhibited therein are correct.

Signed Duplicates.

Balt. Jan. 1829. *Asst. Supt. of Construction.*

Form II.

Return of Grading and clearing executed in behalf of the Construction of the Balt. and Ohio Rail-road, and to be accounted for in running measure.

Division No.	Section No.	Distance Graded.	Distance Cleared	Approximate average of work done	Remarks
		Poles	Poles	Poles	

I certify that the above return is correct, and exhibits a true statement of the distances graded and cleared on the several portions of the Baltimore and Ohio Rail-road therein specified.

Signed Duplicates.

Balt. Jan. 1829. *Asst. Supt. of Construction.*

Form III.

Return of Masonry executed, and of Stone delivered in behalf of the Construction of the Balt. and Ohio Rail-road, to be accounted for by the perch of 25 cubic feet..

Division No.	Section No.	Masonry Complete	Stone Delivered	Stone Laid	Remarks
		Perches.	Perches.	Perches.	

I certify that the above return is correct and exhibits a true statement of the masonry executed, stone delivered and stone laid on the several sections of the Rail-road therein specified.

Signed Duplicates.

Balt. Jan. 1829. *Asst. Supt. of Masonry.*

Form IV.

Abstract and Return of Payments made by the Superintendent on account of Clearing, Grubbing and Grading, in the Construction of the Balt. and Ohio Rail-road for the year ending on the 31st December, 1828.

Names of Contractors employed on Division No.	No.	Amt. of work done		Price per contract per yds.		Amount		Amount paid		Remarks
		Excava'n Cub. yds.	Embnk't Cub. yds.	Dlls	Cts	Dlls	Cts	Dlls	Cts	
		Running measure perches		per prch						being the approximate average.

I certify that the above return is correct and exhibits a true statement of the work done as per returns of my assistants, hereunto annexed,—of the rates at which the several contractors were employed, and of the amounts actually paid for their respective services.

Balt. Jan. 1829.

Signed,

Superintendent.

FORM V.

Abstract and Return of Payments made by the Superintendent, on account of Contingencies and Extra Allowances made to Contractors, and other persons, employed in the Construction of the Baltimore and Ohio Rail-road, for the year ending on the 31st December, 1828.

Names of Contractors, &c.	Nature of service or of the allowance	Rates of service or allowance	Amount Paid		By what authority
			Dols	Cts	

I certify that the above Return is correct, and that the allowances and payments therein specified, were made in furtherance of the construction of the Rail-road, and in conformity to instructions from the Board of Engineers (or from the Board of Directors, as the case may be,) or from any member of the Board of Engineers.

Balt. Jan. 1829.

Signed,

Superintendent.

Y. 1. (See Nar. pp. 125, 127, 159.)

To the President and Directors of the Baltimore and Ohio Rail-road Company.

GENTLEMEN,—In conformity to a resolution of your Board passed December 1st, 1828, requiring of the Board of Engineers, "a plan for the prolongation of the Rail-road from the first stone on the south western line of the city, to tide water within the city of Baltimore," and instructing them as an indispensable provision in any plan that they may adopt "to keep in view the accommodation of the city as now improved," the Board of Engineers after a most careful and sedulous attention to this duty, have now the honor of submitting their views together with the result of their labours and inquiries in reference to this object. The first consideration presented on a view of this subject, is the position of the main line or stem of the Road, with reference both to the natural surface of the country around the city, and to the improvements within it. But as this consideration was regarded as one of the leading principles that should govern in

the assignment of a location westward of the "first stone," we need only refer you to the reports submitted by this Board in June and September last, for a full exposition of its views, as to the elevation of this part of the main line above tide. We beg leave on this occasion, however, to add that our confidence in the correctness of the views then given is unabated, and that the surveys subsequently made within the limits of the city, have contributed to confirm our convictions of their propriety and correctness. We take the liberty to reiterate two of the leading considerations which we have ever regarded as entirely compatible with your instructions and essential to the accommodation of the "City as now improved," viz: that the main line should have its locality as remote as possible from the bustle and business of the city, and that this line should be of a suitable height above its maritime border, not only to afford the means of safe and easy access to all its docks and basins, but also to its retired and more elevated parts. Another consideration of equal importance may also be urged with the same propriety, viz. that the main line should at no point within the limits of the city, deviate from the assumed level; but that all communications between it and "tide water" or any other parts of the city, should be effected by means of Branch Rail-ways, and that no part of these lateral or Branch Rail-roads of a greater or less elevation, should be regarded as a continuation of the *main line.*

With these views the appropriate surveys have been made, and the main line prolonged from the "first stone" on a level of 66 feet above tide, in a direction adapted to that level, and leading through the environs of "the city as now improved," *passing the high grounds situated between Pascault's row and Centre street by means of a tunnel about half a mile long*, crossing Jones' falls at a point a little below Keller and Forman's mill, continuing in a direction north, 84½ east, and terminating for the present at its intersection with the Belle Air road. The route here designated, passes in the rear of Mount Clare house, crosses Pratt street in the valley of the middle branch of three pronged branch at an elevation of about 8 feet above the present grade of the street. Baltimore street at a depression of five feet. Cove street at a level or nearly so. Lexington street at an elevation of 4 feet. Green, Paca, Mulberry, Eutaw, Howard, Franklin and Park streets at various depressions from 15 to 40 feet. Belvidere street at an elevation of about 30 feet, Jones' falls at an elevation of about 60 feet. York avenue, at a depression of about 2½ feet. Ensor street at a depression of 10 feet, and reaches the Belle Air road at an elevation of about 8 feet above it. Hence it may be perceived that all the main avenues leading *in the city to* the country, viz: the Belle Air and York roads,

the Fall's turnpike, the Reisterstown, the Franklin, the Fredericktown and the Washington turnpikes may be rendered secure from any obstructions from the transit of the main line of the Rail-road.

The locality and other circumstances attending the route, will be better understood by an inspection of the map, sketches and profiles herewith submitted, to which we beg leave to refer.

In addition to the main line as above described, several branches diverging from it at various points, and extending to tide water and other parts of the city were also surveyed, and numerous others might have been run, but for the inclemency of the weather which prevented field operations; these will however be sufficient to satisfy the Board of Directors that at the elevation on which the main road is conducted, its traffic may be diffused "throughout all parts of the city as now improved," or be conducted to any points of its harbour or navigable shores between Carroll's point and Harford run.

The routes surveyed as branches leading from the main line to tide water, are as follows, viz:

1st. A Branch commencing at the intersection of the main line with Canal or Harford Run street, and leading down the latter to the city dock and block.

2. A Branch by Belvidere or South street to Bowly's wharf.

3. A Branch by Cove, to its intersection with Eutaw street.

4. A Branch by Baltimore street to Jones' falls.

5. A Branch by Pratt street to the Basin.

6. A Branch commencing on the main line at a point west of Mount Clare, and leading down to Ridgely's cove.

The following routes leading from the main line northwardly, have also been surveyed, viz:

7. A Branch commencing at a point in the main line near the Penitentiary, and leading upwards along the valley of Jones' falls on the east side of that stream.

8. A Branch by Cove street, upwards to its intersection with the Pennsylvania avenue.

9. A Branch commencing near the intersection of the main line with Pratt street, and leading upwards along the valley of the middle branch of three pronged branch to its source.

These routes, as has been already intimated, were surveyed, not as the only favourable lines of communication between the Rail-road and the various parts of the city improved and unimproved, but as examples of the manner and facility of connecting this great avenue, with almost any point or depot, with which it may be desirable or expedient to form a connexion.

The relative positions of the main line and several Branches *above enumerated*, together with their connexion with the vari-

ous parts of the city, are exhibited in the "Map of the proposed routes of the Rail-road within the City of Baltimore," drawn by Lieut. Barney.

The positions of the routes with respect to the natural surface of the ground, the grades of the streets, and their respective elevations above tide water, are exhibited in the "Profiles of the Proposed Routes for the Rail-road," drawn by the same officer.

The buildings situated in the vicinity of the main line, and likely to be in the way of grading the road, and constructing the Tunnel, together with their "description, dimensions, &c." are exhibited in the "Sketch of the Main Line, showing its passage through certain improved parts of the City of Baltimore," drawn by J. Ranney.

The amounts of the excavations and embankments requisite in grading the Main Line from the "First Stone," to its intersection with the Belle Air avenue, are stated in Document marked A, furnished by Lieut. Thompson.

The Documents above mentioned are herewith respectfully submitted.

In further explanation of our views we would observe, that it will be necessary slightly to change the grades adopted for the streets of the city in a few instances, in order to effect an easy and advantageous connexion between the streets alluded to and the Rail-road. For instance, the grade of Pratt street, should be made a few feet lower, that of Baltimore a little higher. Those of Canal and Belle Air streets a little higher, &c. It should moreover be observed on this occasion, that all the places where any considerable changes in the established grades are required, are at present among the unimproved parts of the city, and that no material derangement of buildings or other improvements is likely to be incurred by adopting the alterations adverted to. With respect to the branches their appropriate grades will be such as are best adapted to the localities of the city over which they pass. Those within the improvements of the city may conform to the grades already adopted, and the others may be adjusted to such grades as will best subserve the purposes of the business to which the Rail-road is likely to give birth, and the convenience of the city in other respects.

No Estimate has been made of the expense of grading and paving on the several branches, inasmuch, as it is contemplated that the grades best adapted to the exigencies of the city with respect to the Trade, will be sufficiently conducive to facility of intercourse with the Main Line. The pavement alluded to is a *McAdamized* covering for the Road-bed six inches deep, and

the rails a double series of curb stones set edgewise into the pavement (whether the latter be of rubble or of McAdamized stones) and plated with iron rails 2½ inches wide by ½ inch thick. Wherever the amount of excavation on the Main Line exceeds that of embankment or the reverse, the greater amount only is estimated. The excavation for the Tunnel is computed for an open cut with vertical sides, thus prepared for the reception of the masonry, which will cost much less in this way than by undermining.

By order of the Board of Engineers.

Signed, S. H. LONG, Pres't.

Extract.

Z. 1. (See Nar. p. 127, 159.)

To the President and Directors of the Baltimore and Ohio Rail-road Company.

Gentlemen:—With a view of ascertaining with greater precision the best route for the Rail-road, between the 'first stone' and Baltimore street, and thence to its intersection with Lexington street, four routes have been surveyed, in addition to that reported by this Board on the 31st of January last. These several routes unite near the intersection of Lexington with Pine streets, *and may all be prolonged through Lexington hill*, by one common route, as reported at the date just mentioned.

The Routes are as follows, viz:

1st. The route just referred to, which passes a little north of the first stone, and reaches Lexington street at a point in front of the west end of Pascault's row, and at an elevation of five feet above Lexington street. The distance on this route is one mile 4018 feet. The amount of embankment 109,414 cubic yards and that of excavation 158,619 cubic yards.

2d. A route leading in a straight direction from the first stone to the Washington monument, and crossing Lexington street near the intersection of the latter and Pine street, and on a grade with the former. This route passes a little to the south of the first stone, and embraces a distance of one mile, 3,665 feet to its intersection with Lexington street. The amount of excavation is 233,114 cubic yards; of embankment 41,518 cubic yards.

3d. A route leading through the gravel bank or pit, on the land of James Carroll, Esq., and across the southerly point of hay barrack hill, on the estate of the same gentleman, thence across the valley of middle branch of *three pronged branch*, in a direction nearly perpendicular to that of the stream; thence along the western slope of the swell separating the waters of the stream just men-

tioned from those of Chatsworth's run, and thence across the swell to Lexington street, which it crosses on a level. The distance on this route is one mile, 4085 feet. The amount of excavation is 116,789 cubic yards; that of embankment 110,540 cubic yards.

4th. A route branching from that last mentioned, at a point a little east of the valley of the mid branch above mentioned, crossing Pratt street nearly on the grade of the latter, leading a little north of the residence of Mr. Woolfolk, and meeting Lexington street at the place of common intersection as heretofore designated. This route has an aggregate extent of one mile, 4008 feet. The amount of excavation is 105,423 cubic yards; that of embankment 120,068 cubic yards.

5th. A route branching as above and passing a little south of the same residence, entering Pine street and pursuing this street to its intersection with Lexington street, which it crosses at an elevation of about five feet. The aggregate distance on this route is one mile, 4527 feet; amount of excavation 67,897 cubic yards; amount of embankment 144,832 cubic yards.

The routes above mentioned are exhibited in plan and profile, on the drawings herewith submitted, and consist of two documents of the following import, viz:

"A sketch drawn by Mr. Ranney on a scale of half an inch to one hundred feet, and exhibiting the horizontal position of the several routes surveyed with a view to the prolongation of the Rail-road from the first stone into the city." Upon this drawing are designated some of the most prominent land marks in the vicinity of each route.

"Profiles of the several routes delineated by S. E. Chesbrough, and exhibiting the vertical position of each route, with respect to the level of mid tide, and to the line sixty-six feet above that level." The distances on the several routes from the first stone to Lexington street, are also exhibited on this drawing. The amounts of excavation for each cutting above, and of embankment for each filling below the sixty-six feet level, are annexed to this drawing.

The surveys and computations have been executed by Lieuts. Thompson and Barney, aided by others in the service of the Rail-road company, in a manner and with a despatch highly creditable to those engaged in them.

Respectfully submitted, by order of the Board of Engineers.

Signed, S. H. LONG, *President.*

To P. E. THOMAS, Esq. *President*
of the Baltimore and Ohio Rail-road Company.
Balt. May 2, 1829.

A, 2. (See pp. 133, 138)

Estimate of Masonry built and stone delivered on the 1st. and 2d. Divisions of the Baltimore and Ohio Rail-road, 31st. March, 1829. Estimate made by Robert Wilson, agent of Masonry.

Names of Contractors.	Division.	No. of Section.	Amount of Masonry built and stone and other materials prepared.	Amount of stone delivered.	Amount due each contractor.	Amount paid each contractor.	No. of Masons & laborers.	Remarks.
James Lloyd,	1	1,10	4,000,00		4,000,00	3,000,00	140	Gwynn's falls and Gadsby's run Br.
Jacob Councilman,		8,9,10,11,12,		3,405,00	3,405,00	2,720,00	10	
William Scharff, & Co.		2,3,4,5,6,7,	6,112,00		6,112,00	5,267,75	32	
James Sherer,		10	553,75		553,75	425,00	12	
James Carrick,		8	97,25		97,25	80,00	5	
Alexander Turner,		8,9,10,	1,121,25		1,121,25	1,010,00	5	
John Grey & Co.		12,13,	441,50		441,50	360,00	10	
John Wever,		13,17,	738,40		738,40	575,00	14	
Henry Marshall,		14,15,16,	376,50		376,50	330,00	9	
Simon Frieze,		15,20,	363,12		363,12	300,00	21	
John Baker,		15,	375,00		375,00	295,00	12	
James Mills, & Co.		18,	565,12		565,12	510,00	11	
John McCartney,		21,	3,500,00		3,500,00	3,500,00	70	Patapsco Bridge.
Wm. Gamble,		22,23,24,25,	698,68		698,68	625,00	13	
Adam Virtue,		26,	515,56		515,56	465,00	13	
Stephen Stafford,	2	1,2,	185,62		185,62	140,00	7	
Alexander Turner,		21,22,23,24,25,26,	997,50		997,50		57	
					54,051,25	19,602,75	441	

Mr. Turner was blown up, lost his right arm, and the left dreadfully injured.

Note. This estimate does not embrace any work which has

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been completed and fully paid for, nor does it include the work done by Springer.

Signed, CASPAR W. WEVER,
Superintendent.

To the Board of Engineers of the Baltimore and Ohio Rail-road Company.

April, 1*st*. 1829.

B. 2. (See Nar. p. 143.)

OFFICE OF THE BOARD OF ENGINEERS,
May 20th, 1829.

SIR:—The Board of Engineers have now the honour to report upon their inquiries, and upon the labours of the Engineer Department of the Baltimore and Ohio Rail-road Company in reference to the selection of a route for the Rail-road from Parr's spring ridge to the "Point of Rocks."

With a view to the accomplishment of this object in a manner entirely satisfactory, and in order to lay before you an adequate description of the country situated between the points above mentioned, this entire district was first examined with the greatest care, and the following routes leading through it were subsequently surveyed with the utmost precision, viz:

1st. A route commencing at the Point of Rocks, descending along the margin of the Potomac to the mouth of the Monocacy, thence passing eastwardly, along the valley of this stream, to McPherson's mill, thence crossing the Monocacy and proceeding eastwardly to the valley of Bennett's creek and thence along the valley of this creek to Parr's spring ridge. The distance by this route is 30 miles and 683 yards. The elevation of the summit above extreme high water at the Point of Rocks is 601 feet.

2d. A route from the Point of Rocks to Chapel Ridge, which it crosses at the distance of about a mile southwardly of the Catholic Chapel, thence in nearly a straight direction to Buckey's mill, where it crosses the Monocacy at an elevation of about 73 feet above the surface of the Mill Pond, thence to the valley of Bush creek, which it enters at a point about 800 yards from its confluence with the monocacy, and thence by the valley of Bush creek to Parr's Spring Ridge. The distance by this route is 26 miles and 1516 yards. The elevation of the summit above extreme high water at the Point of Rocks is 601.5 feet.

3d. A route pursuing the same direction as route No. 2, to a point south of the Chapel before mentioned, thence passing about ½ a mile northwardly of Buckey's-town, in nearly a straight

direction to Ballinger's creek, which it crosses about half a mile above its mouth, at an elevation of 37 feet, thence along the valley of the Monocacy, and crossing this stream at an elavation of about 24 feet above low water, at the distance of about 100 yards above the bridge, now in progress of construction at that place, and thence by the valley of Bush creek to Parr's spring ridge. The distance by this route is 25 miles and 983 yards. The elevation of the summit above extreme high water at the Point of Rocks is 601.5 feet, to which must be added the ascent from the Monocacy to Chapel ridge summit, giving an aggregate ascent of 651 feet.

4th. A route pursuing the same direction as route No. 2, to a point on the north side of the Monocacy opposite the mouth of Bush creek, thence along the valley of the Monocacy to the mouth of the Linganore, where it crosses the Monocacy at an elevation of 28 feet, and thence by the valley of the Linganore to Parr's spring ridge. The distance on this route is 32 miles and 606 yards. The elevation of the Main summit above extreme high water at the Point of Rocks is 551 feet, to which must be added the elevation of the Chapel ridge summit, giving for the aggregate ascent 593 feet.

5th. A route commencing at the same point as above, and passing along the southerly base of the Catoctin mountain to Smith's branch of Tuscarora creek, thence to Chapel ridge which it crosses at the distance of about three-quarters of a mile northeastwardly of the Chapel, thence northeastwardly to Ballinger's creek, which it crosses in the vicinity of Kemp's mill; thence by the most favorable route to Frederick town, where it enters the valley of Carroll's creek, thence by the valley of said creek to the Monocacy, crossing this stream at an elevation of 28 feet, thence along the valley of the Linganore to Parr's spring ridge. The distance by this route is 35 miles and 200 yards. The elevation of the main summit above extreme high water at the point of Rocks is 551 feet, to which must be added the elevation of the Chapel or Red ridge summit making an aggregate ascent of 623 feet.

For a more particular description of these several routes, we beg leave to refer to the annexed extract marked A. from the Report of Lt. Gwynn, the officer charged with the surveys made in relation to them.

The routes above enumerated intersect the Parr's spring ridge at the following points, and in the following order, viz: No. 1 at Parr's spring; Nos. 2 and 3, near Ridgeville; and Nos. 4 and 5 at Grimes' spring. By a prolongation eastward they all unite at the confluence of Parr's and Gillies' falls, making the aggre-

gate distance on each route from the Point of Rocks to their common junction, at the place just before mentioned, as follows:

Routes	From the Point of Rocks to Parr's spring ridge.	From Parr's spring ridge to junction of Parr's and Gillie's falls.	Aggregate.
	miles yds.	*miles yds.*	*miles yds.*
No. 1	30 683	6 490	36 1172
2	26 1516	5 1396	32 1152
3	25 983	5 1396	31 619
4	32 606	5 1029	37 1635
5	35 200	5 1029	40 1229

In accordance with an opinion advanced by this Board on a former occasion, in reference to the inclination required for the spontaneous descent of carriages upon a Rail-road, constructed in the manner contemplated for the Baltimore and Ohio Rail-road, the cost of transportation upward on an ascent of 30 feet perpendicular height, whatever may be the distance, or in other words, the amount of power required to ascend an elevation of 30 feet, in addition to that required on a level Rail-road of the same extent, would at least be equivalent to that required for conveyance through a distance of one mile. Subsequent experiments on the Baltimore and Ohio Rail-road, have contributed not only to establish the correctness of the opinion, but also to afford unequivocal testimony, that an elevation considerably less than that just mentioned, is to be regarded as an impediment more difficult to be overcome than the distance of a mile on a horizontal road. Nevertheless we shall on the present occasion, adhere to our former mode of estimating the disadvantages attendant upon ascents, and regard an elevation of 30 feet as equivalent to one mile, so far as it relates to the cost of transportation.

Agreeably to this assumption, the following table exhibits the comparative advantages of the several routes with respect to the cost of transportation, computed for equivalent horizontal distances, and expressed in equated distances between the Point of Rocks and Parr's spring ridge.

Routes	Actual Distance.	Aggregate Ascents.	Equated Distances.	Differences.
	miles yds.	*feet.*	*miles yds.*	*miles yds.*
No. 1	30 683	601	50 1269	3 897
2	26 1516	601 .5	47 372	0 000
3	25 983	651	47 455	0 283
4	32 606	593	52 183	4 1571
5	35 200	623	55 1537	8 1155

The column headed "differences" shows the excesses of the longer routes over the shortest, which, agreeably to the foregoing view of the subject, appears to be the route designated No. 2.

The preference, therefore, that ought to be given to either of the foregoing routes, if we regard *merely the cost of transportation*, must be awarded to that last mentioned, while the preference with regard to the cost of construction, as will be presently shown, should be awarded to route No. 3.

In order to illustrate our views still further in reference to this subject, it will be proper to exhibit a brief comparison of the probable expense of transportation, likely to be incurred annually by adopting the longer in preference to the shortest route; and with this view, we beg leave to submit a few remarks, predicated on the probable state of the traffic as assumed and promulgated in the "Proceedings of sundry citizens of Baltimore convened for the purpose of devising the most efficient means of improving the intercourse between that city and the western states." In the document just adverted to, it is supposed that the amount of freight eastward will be at least 150,000 tons annually, and in the opposite direction 50,000 tons annually. The legal charge for toll and transportation in the former direction is 4 cents per ton per mile, and in the latter 6 cents per mile: accordingly, if we allow equal distances on the several routes to be cancelled by each other, the comparative cost of transportation thereon will stand as in the following table, viz:

Routes	Relative Distances.		Cost of Transport'n Eastw'd.	Cost of Transport'n Westward	Annual difference of Transportation.
	miles	*yds.*	*Dolls.*	*Dolls.*	*Dolls.*
No. 1	3	897	21,023	10,511	31,534
2	0	000	00,000	00,000	00,000
3	0	283	283	141	424
4	4	1579	29,383	14,691	44,074
5	8	1165	51,971	25,985	77,956

In regard to the transportation of passengers no estimate will be attempted, inasmuch as the amount of travel that may be anticipated, is far more vague and uncertain than that of tonnage, and would render any opinion in reference to this subject altogether unsatisfactory. This consideration, however, could not fail to place the longer routes in a more unfavourable light than that afforded by the foregoing representation.

The surveys under consideration were preceded by a careful and minute examination of every part of the country, presenting the slightest facilities for the passage of the Rail-road. The

examinations were even more widely extended than they would have been, in consequence of the strong desire manifested on the part of the Directors of the Rail-road Company, to have the road located in such a manner as would facilitate as much as possible, a connexion with the flourishing capital of Frederick county, and accommodate the trade of the Monocacy Valley. The routes that have been examined and found objectionable are too numerous to be mentioned on this occasion, and we beg leave merely to observe in relation to them, that their claims to consideration cannot come into competition with those enumerated in this paper.

A few observations with respect to the probable cost of construction on the several routes above described, may not be superfluous on this occasion.

The surface of the country traversed by Route No. 1 is generally undulating, and will require frequent cuttings and fillings of moderate depth. The most expensive portions of this route will be the passage of the Monocacy and its valley; requiring an expensive bridge and embankment, and at a place about midway between the stream just mentioned and Parr's spring ridge, where the cost of grading will be much enhanced by deep excavations and high embankments leading across numerous spurs and ravines. Bennett's creek must probably be crossed at least four times by means of as many bridges. This route is unavoidably rendered serpentine by the conformation of the natural surface, which presents numerous spurs of considerable extent alternately protruding between each other on both sides of a direct route.

The average cost of grading on this route, exclusive of the bridges just adverted to, will not probably be less than $4000 per mile. The cost of a bridge across the Monocacy may be estimated at $15,000, and of the four bridges across Bennett's creek at $3000 each.

In regard to routes Nos. 2 and 3, our opinion has already been given in part, in the first Annual Report of this Board. This opinion was predicated on information far more limited than that now in our possession, and we beg leave to qualify it in the following manner. The average cost of grading from the Point of Rocks to the Monocacy, will probably be about $5000 per mile, as stated in the report alluded to; but between the Monocacy and [illegible]r's spring ridge, owing to several cliffs which will consi[illegible]ably enhance the expense of a road bed which must be form[illegible] their sides for an aggregate distance of about one mile, the [illegible] of construction will probably exceed $2500 per mile, which

was the original estimate. The additional cost of this mile will probably be about $5000.

With respect to route No. 2, the cost of grading in the valley of Bush creek is estimated in the same manner as for route No. 3—viz: at an average expense of $2,833.33 per mile. On a distance of about three miles of this route, between McPherson's saw mill on Bush creek and Buckey's mill on the Monocacy, the expense of grading may be estimated at $4000 per mile, and between Buckey's mill and the Point of Rocks at $5,500 per mile. Hence the average expense of grading on route No. 2, will be about $3,794 per mile, to which must be added the cost of a bridge across Bush Creek, estimated at $3000, and of a bridge across the Monocacy, more than 70 feet high, which may be estimated at $20,000.

And the average expense of grading on route No. 3, will be about $3,750 per mile, to which must be added $10,000, estimated cost of a bridge across the Monocacy, as in the report before mentioned.

On route No. 4, the grading will be rendered very expensive, in consequence of the frequent crossings of the Linganore, the floods of which rise much higher than those of Bennett's or Bush creeks, and inundate its valley to a greater distance from the bed of the stream. The bridges across it must be located above the reach of the highest freshets, and will of course require a corresponding elevation of the road above the adjacent bottom lands. In addition to this inconvenience, numerous cliffs present themselves in the way of the most eligible route, the sides of which must be traversed by the road. These considerations have induced us to estimate the average cost of grading in the valley of the Linganore at $4,500 per mile, to which must be added the cost of six bridges at $3000 each. From the mouth of the Linganore by the valley of the Monocacy and the Chapel before mentioned, to the Point of Rocks, the average cost per mile will be about $5000, to which must be added $12,000, the estimated cost of a bridge across the Monocacy. Hence the average cost of grading on route No. 4, will be about $4,640 per mile, and the aggregate cost of bridges $30,000.

The cost of grading on route No. 5, will be the same as estimated for No. 4, so far as relates to the valley of the Linganore, viz: $4,500 per mile; and between the mouth of that stream and the Point of Rocks, via Fredericktown, it may be estimated at $5,500 per mile—making an average of about $5,015 per mile for grading upon the whole route; to which must be added, as before, $18,000 for six bridges across the Linganore, and $12,000 for a bridge across the Monocacy.

The subjoined table exhibits a summary view of the expense of construction, as deduced from the foregoing statements.

Routes	Cost of Grading per mile.	Aggregate cost of grading.	Aggregate cost of wooden bridges.	Aggregate cost of Construction.
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*
No. 1	4,000	120,000	27,000	147,000
2	3,794	94,866	23,000	117,866
3	3,750	97,500	10,000	107,500
4	4,640	148,500	30,000	178,500
5	5,015	175,500	30,000	205,500

Two maps, drawn by H. J. Ranney and E. S. Chesbrough, marked B. and C., and exhibiting the position of the several routes in *plan* and *profile* are herewith submitted, and will afford additional illustration in reference to the surveys.

Respectfully submitted,

By order of the Board of Engineers,

S. H. LONG, *President.*

To PHILIP E. THOMAS, Esq.,
President of the Baltimore and Ohio Rail-road Company.

C. 2. (See Nar. p. 159, &c.)

Baltimore, June 1st 1829.

GENTLEMEN:—In addition to the several Routes heretofore surveyed with a view to the prolongation of the Rail-road from the first stone *through Lexington hill*, (within the City of Baltimore) and reported to the Board of Directors of the Baltimore and Ohio Rail-road Company, I have the honor to report on four routes, more recently surveyed under my direction, and in pursuance of your instructions of the 25th ult.

The routes here alluded to, are numbered from 6 to 9 inclusive and are common or coincident from Gwynn's falls to a point about 250 feet west of the Hay-Barrack, on the estate of James Carroll, Esq. embracing a distance of 1506⅔ yards.—Throughout this distance the route has the locality most favorable for construction. The amount of excavation and embankment required in grading it being as nearly as may be the least practicable or a minimum. At the point just mentioned, and at two other points farther in advance, the routes diverge in four different directions, and form* the number of routes first men-

*Routes No's 1, 2, 3, 4, and 5, are exhibited and described in Documents *Y. 1. and Z. 1.* See Appendix, p. 76 to 80.

tioned, which will be considered separately and in the following order, viz:

No. 6. Commences at Gwynn's falls, pursues the route heretofore located agreeably to the instructions of the Rail-road Company, crosses the gravel bank at a depression of about 14 feet, the high ground in the rear of Mt. Clare at a depression of 30 feet. The valley of Sulphur pump run at an elevation of 18 feet, Hay Barrack hill at a depression of 2 feet, valley of Carroll's branch at an elevation of 33½ feet, Pratt street at a depression of 4 feet, and Baltimore street at a depression of 8 feet.

This route deflects to the south near the Hay Barrack, and having crossed the valley of Carroll's branch deflects again at a maximum curvature and pursues a direction parallel to Amity alley and at a distance of 33 feet west of the alley, to Pratt street, which it crosses at a depression of 4 feet, and thence by a slight deflection to Baltimore street. This route is deemed objectionable on account of the heavy embankment in the valley of Carroll's branch, the curvature unavoidable in order to effect a parallelism with Amity alley, and in passing from Baltimore to Lexington street, and on account of the differences between the grades of Pratt, Baltimore, Cove, and Lexington streets, and that of the Rail-road, to which may be added an increased distance, and an extensive excavation between Baltimore and Lexington streets. The aggregate distance on this route, from Gwynn's falls to Baltimore street at a point about 300 yards west of Cove street is 1 mile, 1096 yards and 2 feet.

No. 7. Has the same locality as No. 6, to Pratt street, where it deflects at a maximum curvature, and crosses McHenry's ridge at a depression of 27 8-10 feet. Cove street nearly on a level, and terminates in Baltimore street nearly on a level with its grade, and at a point about 60 yards east of Cove street. The aggregate distance on this route is 1 mile, 1367 yards and 1 foot.—The numerous curvatures, together with the great amounts of excavation and embankment attending it, may be regarded as serious objections to this route.

No. 8. This route diverges from No's 6 and 7, at the point before mentioned, 250 feet west of Hay Barrack, crosses the valley of Carroll's branch, at an elevation of 28 feet, Pratt street at a depression of 8 feet, McHenry's ridge at a depression of 19½ feet and becomes coincident with No. 7, at Cove street.—The aggregate distance on this route, from Gwynn's falls to Baltimore street is 1 mile, 1280 yards and 2 feet.

No. 9. Diverges from No. 7 at a point near the Hay Barrack, crosses the valley of Carroll's branch at an elevation of 32 feet, McHenry's ridge at a depression of 19 feet, Pratt street at a depression of 3½ feet, a spur of McHenry's ridge at a depressio

ting through ridges, and embanking across valleys. The aggregate cost of grading and bridging on this part of the road, has been about $108,740, or $16,730 per mile.

On the second division of the Rail-road which extends from Ellicott's mills along the immediate valley of the Patapsco, to the confluence of the North and South forks of that stream, a distance of about 11½ miles, the facilities for construction become obviously greater, and the actual cost of grading and bridging has been proportionally less. The bridges and culverts on this division are completed, and about three fifths of the grading has already been accomplished. The aggregate cost of these items, on the second division will have been about $118,450, or $10,300 per mile.

It is expected that the formation of the Road-bed on a distance of about 10 miles next above the second division will prove equally as expensive as that of the portion just mentioned, but that the grading and bridging on the residue of the distance (33 miles) to the Potomac river at the Point of Rocks, will not cost more than $231,000, or $7000 per mile.

F. 2. (See Nar. p. 177.)

In the latter part of March, 1830, several mechanics of Baltimore, of the first respectability and standing in their profession as practical carpenters, visited the Jackson bridge, erected in August, 1829, over the Rail-road, 2¼ miles from that city, and kindly communicated to Col. Long their written opinions in regard to the stability and efficiency of the bridge. They unanimously concurred in the following statements, viz: they were greatly pleased with the simplicity and economy, as also with the style of workmanship displayed in its construction. They regarded it as possessing all the strength and firmness requisite in a structure of this kind, and as likely to retain them, as long as the materials should be exempt from natural decay; which, from the manner in which they were protected from the weather, was not likely to take place for many years. They ascertained that the strings of the bridge retained a *camber*, or arched form, as nearly as they could judge, the same as that given it at the time of its construction, which was equivalent to a rise of about one inch, at the centre; and they regarded this circumstance "as the best possible evidence of its strength" and permanency. They were also of the opinion, that the fact of its having been constructed of unseasoned timber, and of its nevertheless retaining its original shape and posture, without the least apparent derange-

ment in any of its parts, was conclusive evidence, not only of its efficiency and stability, but of the propriety, correctness, and utility of the principles and method exemplified in its construction.

We shall not give the names of the gentlemen alluded to, inasmuch as it would not be proper to do so without asking their permission; but shall present the following testimonial in confirmation of their opinions.

Baltimore, April 8, 1830.

The subscribers have examined the bridge alluded to in the foregoing statements, and have no hesitation in expressing their full concurrence in the opinions therein advanced.

They moreover cheerfully recommend the structure to the attention of the public, as a more correct, substantial, efficient and economical specimen of bridge architecture, than has ever before come within the sphere of their observation.

Signed,

WM. F. SMALL,
Archt. and Civil Engr.
ROBERT CAREY LONG.

G. 2. (See Nar. p. 180.)

Ellicott's Mills, 30th October, 1829.

Sir,—Your letter of the 27th of this inst. written by the direction of the Board of Engineers for the purpose of making "such inquiries as shall be calculated to disclose the authority under which provision was made for the erection of two common road arches and road ways in the Bridge now constructing across the Patapsco, and the terms agreed upon for the same," has been just received.

In answer, I have to state, that I do not now distinctly recollect whether those road arches and road ways were constructed solely by my own authority, or whether they were sanctioned by Col. Long and Mr. Thomas also; as respects the latter, I am of opinion that he concurred in the propriety of the measure—but he will recollect whether he did or not. It is probably most likely that Col. Long did not, as I received my principal instructions from Mr. Thomas, from November, 1828, to May, 1829. Of the propriety of their being there I have no doubt. No terms were agreed upon respecting them, but that the builder should be fairly and fully compensated for the extra work thus occasioned.

Signed, CASPAR W. WEVER.

Capt. Wm. Gibbs McNeill,
Member and Secretary of Board of Engineers, of Balt. and Ohio R. R. Co.

H. 2. (See Nar. p. 188.)

Whereas, it having been made the duty of the Board of Engineers, not only to give their sanction to all appropriations of funds required for the surveys and construction of the Baltimore and Ohio Rail-road, and to direct the manner and desiginate the objects in and upon which all expenditures relating to said surveys and construction shall be made,—and,

Whereas, it being obviously proper and expedient, that the said Board of Engineers should not only be made acquainted with all objects calling for expenditures, but that they should also be apprised from time to time of the means employed for, and the progress made towards the accomplishment of those objects,—and,

Whereas, it appearing from the records of the said Board of Engineers, that instructions have at sundry times been given in due form to their superintendent, Caspar W. Wever requiring of him various reports detailing the manner in which expenditures have been made, and the objects to which such expenditures were or should be applied, in the various branches of construction committed to his charge; as also reports setting forth the progress made towards the accomplishment of the work under his superintendence, generally, notwithstanding which requirements on the part of said Board, no such reports, especially in so far as they relate to expenditures incurred on account of construction, during the second quarter of the current year, appear upon the records of said board, nor have they in any tangible shape, been made by the said superintendent, although repeatedly solicited for the same, —and,

Whereas, it appearing that the said Board of Engineers, in consequence of the non-compliance, and negligence of their superintendent as above, are not only ignorant of the character and magnitude of the particular objects of expenditure, and of the actual estimable progress of the work committed to their charge, supervision and control, but also, of the nature of the stipulations entered into between their superintendent, and the contractors employed on said Road, and especially those employed in the construction of bridges, culverts, &c.—And finally,

Whereas, no returns setting forth the quantity of work done during the quarter above mentioned, having been submitted to said Board, by said superintendent, in company with his quarterly accounts due at the close of said quarter, and no reports having been made in relation to the same, at a prior date, from which the said Board of Engineers may be enabled prudently

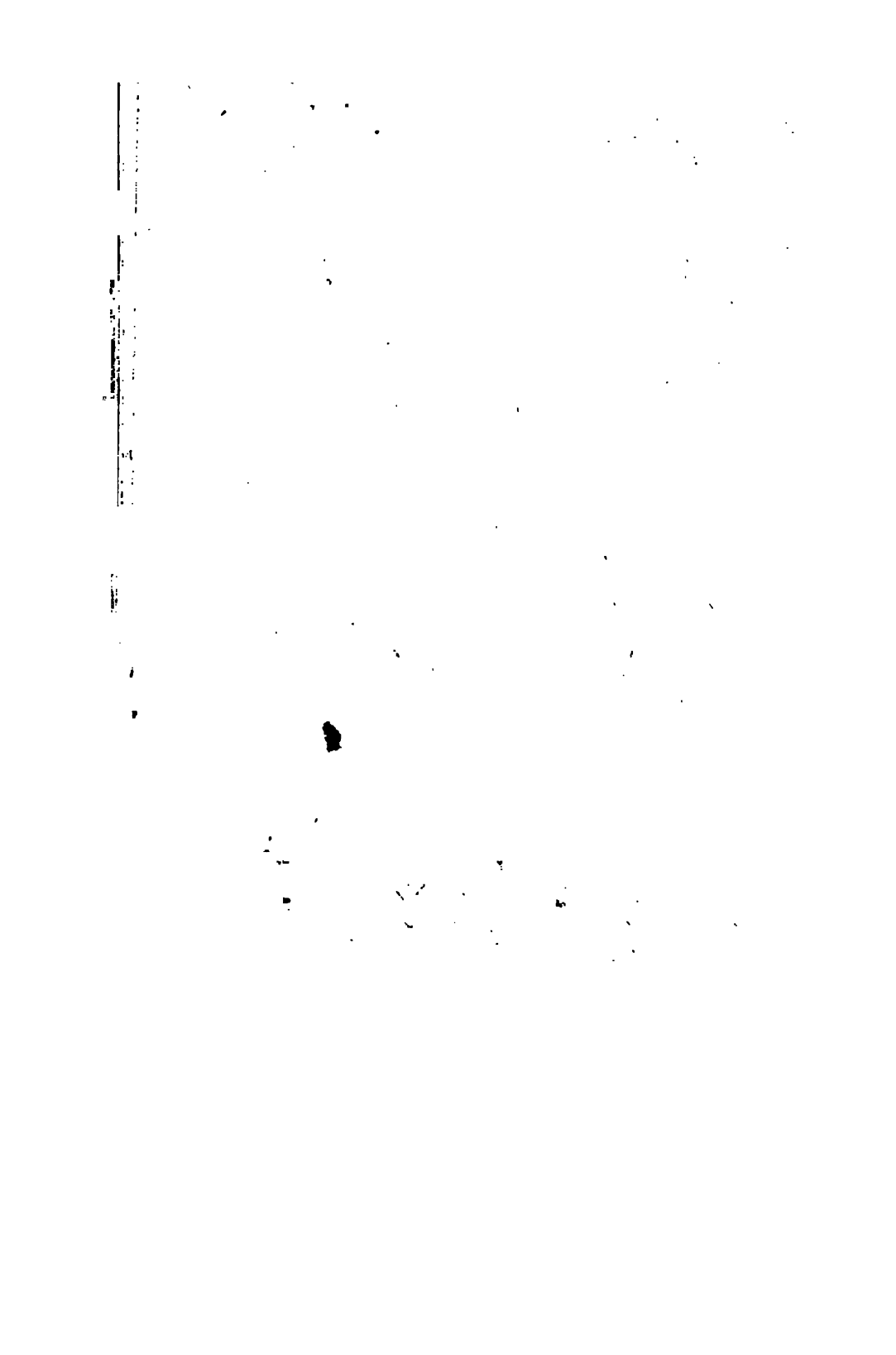
and discreetly to decide upon the correctness of said accounts, and upon which they may ground their approbation of the same,—

Now, therefore, I, S. H. Long, a member of the said Board of Engineers, do hereby protest against the approval of any accounts rendered by agents or officers in the employ of said Board, and in the service of the Rail-road Company, that have not been made in conformity to the "regulations of the Engineer Department" prescribed for their government by the President and Directors of the Rail-road Company; and in conformity to the instructions given by the said Board of Engineers, to their agents as aforesaid, by virtue of the authority vested in said Board of Engineers, by said regulations; also and especially against the approval of the accounts rendered by Caspar W. Wever, superintendent, as aforesaid, for the quarter ending on the 30th of June last, until the said superintendent, in conformity to instructions heretofore given, or to such as may now or hereafter be given, shall render an adequate statement, or report, showing the progress and amount of work done, during the said quarter.

Signed,

S. H. LONG.

Baltimore, July 8th, 1829.



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